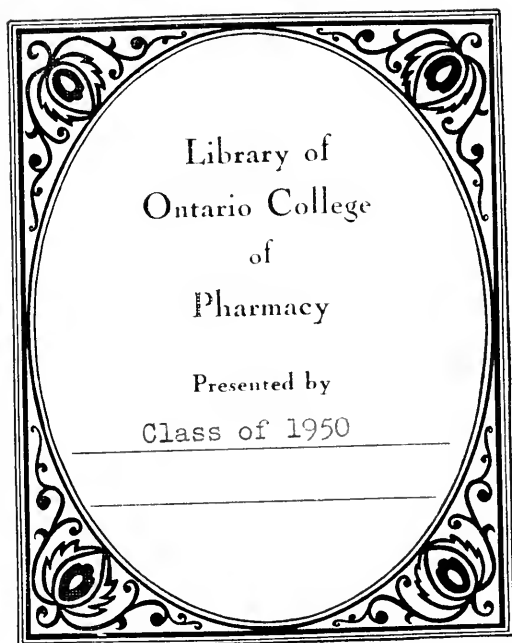




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*JANUARY, 1902.*

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## ON THE PHARMACOLOGICAL ASSAY OF DRUGS.

BY ARTHUR R. CUSHNY,  
Professor of Materia Medica in the University of Michigan.

It has long been a commonplace observation that the galenical preparations of drugs vary in their therapeutic efficiency, and increasing familiarity with the chemistry of plants has shown this to be due to variations in the amount of the active principles. This variation is often of little importance from the point of view of the practitioner, while in other cases its gravity can scarcely be exaggerated. The pharmacopœias have accordingly attempted in recent years to exclude preparations which depart markedly from the standard strength; for example the last edition of the United States Pharmacopœia gave directions for the assay of opium, *nux vomica* and cinchona and of some of their preparations. This is undoubtedly a step in the right direction, for no one can fail to recognize the necessity of standardizing within reasonable limits the strength of a preparation so widely used as laudanum. The necessity for the assay of cinchona and *nux vomica* is not quite so apparent, it is true, for the galenical preparations of these drugs are comparatively seldom used except to elicit their local "bitter" action, the pure alkaloids being usually prescribed when the effects in the blood and central nervous system are desired; that is, when there is even a remote probability of poisonous symptoms being induced. Still, any tendency toward a uniformity in strength is to be greeted as an important advance from the estimation of the strength by the amount of the crude drug employed. So far the chemical assays directed by the pharmacopœia have embraced in the vegetable

materia medica only these three drugs, all of which owe their activity to the presence of alkaloids in some quantity; and if the method be extended in the forthcoming edition, it is probable that only drugs containing alkaloids, such as the belladonna group, will be embraced by it. Those plants which owe their activity to the presence of glucosides will undoubtedly be omitted. Yet the preparations of some of these are in constant use in therapeutics and have to be given in quantities which approach the therapeutic maximum and stand on the threshold of the poisonous dose. I need refer only to digitalis, squill and strophanthus to illustrate this point. It is obviously of the first importance that the preparations of these drugs should be of uniform strength, and yet it is notorious that they vary within wide limits. For example, Jacquet found the strength of some tinctures of digitalis four times that of another, prepared by a different manufacturer, although all were presumably formed according to the same directions. I have not observed such marked divergence in strength, but have found a difference of 50 per cent. in different tinctures. I think there can be no doubt that, if a patient treated with efficient doses of the weakest of Jacquet's tinctures were subsequently treated with the same amount of the strongest (as might very well happen), the effects would almost certainly be alarming and might be disastrous. One result of this variation in the strength of the preparations of these drugs has been the use of the so-called principles, such as the varicus digitalins and strophanthins; I have examined a large number of these and have found them vary even more than the galenical preparations. Some of them, notably the more attractive crystalline forms, were entirely inert, while others were extremely poisonous. In short, they require to be standardized as much as the galenical preparations. But if there can be no question as to the desirability of assaying the glucosidal preparations, there is unfortunately no less doubt of its unpracticability by ordinary chemical methods. If proof of this were lacking, it has been supplied by the painstaking investigations on which Kiliani has been engaged for so many years. A continuous series of publications has issued from his laboratory since 1892, yet only in 1899 he recognized a glucoside already described by Schmiedeberg, but overlooked by Kiliani in all his previous work. It is obviously impossible to assay the tincture of digitalis by isolating each gluco-

side and estimating its amount; and the total amount of glucosides is of no value as an indication of its strength, for they vary in activity from the practically innocuous digitonin to the very poisonous digitoxin. An attempt has been made to assay the drug by the content of digitoxin, but apart from the difficulty of the process, there are other glucosides present which are equally important from the practitioner's standpoint, and these may vary equally with digitoxin. The chemical assay of digitalis may therefore be dismissed as impracticable at present, and in all probability for many years to come.

A new method of assay has, however, been introduced in the last few years and has been adapted to practical pharmacy in this country.<sup>1</sup> I refer to the pharmacological assay or the estimation of the therapeutic activity of a drug by its effects on the lower animals. A certain prejudice, which seems to exist in some minds against this method, may perhaps be ascribed to the innate conservatism of the medical and pharmaceutical professions, and to the belief that results on animals cannot be used as a basis for application in therapeutics. As to the latter point it need only be mentioned that almost all the advance of recent years in medicine is based upon experiments made on our humbler relatives, and that by therapeutic assay the absolute dose is not estimated from animals to man but merely the relative activity. To illustrate this by an example: if a tincture (A) of digitalis is found to induce symptoms in a dog of 30 pounds in the dose of 1 c.c., we cannot infer that 5 c.c. will be equally effective in a man of 150 pounds. But if we find that the dose in man is 2 c.c. by actual clinical experience and now investigate a second tincture (B) on the dog and find that 2 c.c. are required to induce the same symptoms as 1 c.c. of A, we can assume with some probability that the therapeutic dose of B in man will be 4 c.c. Without the preliminary examination on the dog the strength of the remedy could be ascertained only by clinical examinations on patients, and this involves much time and in some cases would not be devoid of danger. Before examining the limitations of this new method of assay it may be necessary to examine its relation to the chemical method. And when the latter

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<sup>1</sup> It is of interest to find Professor Gottlieb, of Heidelberg, advocating the pharmacological assay of digitalis at the meeting of the Congress of Physicians at Wiesbaden in April, 1901.

is practicable, I think it will be used in preference to the pharmacological method, not I believe because it is more reliable or in most cases more accurate, but as on the whole giving more assurance to the operator. There is a sense of finality in weighing an alkaloid obtained after long and complicated methods of isolation which may be absent from the breast of the experimental pharmacologist on viewing the systolic standstill of the frog's heart. The newer method is not a rival of the older but a substitute for it in cases where it cannot be applied. From a theoretical standpoint of course the symptoms elicited in animals is merely an "indicator reaction" of an exceedingly complicated kind but based on chemical processes just as the indicator reactions in titration. For example, the arrest of the frog's heart under digitalis is evidence of the completion of a chemical reaction between the heart muscle and the glucosides just as the alteration in the color of litmus is the indication of a chemical change in titrating an acid. And this arrest does not indicate the presence of any one glucoside but the total strength of the glucosides with this cardiac action, just as the litmus test indicates the total acid in a mixture of several acids.

The questions which arise at once are how sensitive is the test and how constant does it remain? If the frog's heart reacts only to large quantities of digitalis glucosides, the test is obviously of little value; and on the other hand, if the frog requires twice as much digitalis at one time as at another, the method is equally valueless. These questions may best be answered by the narration of a test which I carried out on a series of frogs with a fluid extract of digitalis. I diluted it fifty times and selected eight frogs, four of which received 1 c.c. of the diluted extract, the other four receiving 0.5 c.c. The first four all gave the characteristic reaction, while the second set failed to do so, although they showed symptoms. The quantity required for the test reaction thus lay between 1 c.c. and 0.5 c.c. of the diluted extract, that is between 0.02 and 0.01 of the original. Four fresh frogs then received 0.75 c.c. of the diluted fluid and three of them reacted, one of them failing to do so though severely poisoned. Another set which received 0.6 c.c. all recovered. Finally two frogs poisoned with 0.7 c.c. reacted typically. The limits were thus between 0.7 and 0.6 c.c. of the diluted extract, *i. e.*, 0.014 and 0.012 c.c. of the original, the test indicating a difference of 0.002 c.c. The dose of this preparation ordinarily employed

is 0.05 — 0.1 c.c.; the reaction would therefore indicate any difference amounting to 4 per cent. of the minimal dose, or 2 per cent. of the maximal, which is sufficiently accurate for all practical purposes. An assay made a month later by my assistant, who was in ignorance of my results, indicated 0.013 c.c. as the smallest quantity of the original extract which gave the reaction.

One of the chief difficulties in this method of assay is the sensitiveness of the reagent—the animal—to external conditions. This is especially true in the case of frogs, which vary considerably at different seasons in their reactions unless special precautions be taken. My experience has been, however, that if enough care be taken in the selection of the animals, the results are sufficiently constant. Of course, the size of the animal must be as close to the standard as possible; all abnormal conditions, such as occur in the spawning season, must lead to the elimination of individual specimens, and there are many practical details which can be learned only by actual experience.

When it is possible, it is desirable to assay a specimen in several species of animals in order to eliminate as far as possible such variations; for example, digitalis and its allies may be assayed on the frog, and control experiments may then be performed on the rabbit or some other mammal. In many cases, however, the reaction is much more sharply defined in one species than in others; thus ergot can be standardized practically only on fowls, and cannabis indica is best assayed in dogs in my experience. The actual mode of procedure in making a pharmacological assay can be taught only practically, and a correct use of the method requires a fair knowledge of physiology and experimental pharmacology. The drugs which I have tested with this method are those comprised in the digitalis series which are in common use (digitalis, squill and strophanthus), cannabis indica and ergot. The variations in the strength of the preparations of the digitalis series were considerable, amounting to 50 per cent., but were positively trifling compared with those exhibited by the fluid extracts of cannabis indica and of ergot. I have repeatedly found that those preparations bearing the labels of reputable houses were practically inert in quantities considerably larger than those advised in therapeutics. The method is of course available for other preparations whether they contain alkaloids (gelsemium) or such indifferent substances as are found in male

fern. Some experiments made to determine the strength of purgatives gave no satisfactory results, the minimal dose required to cause evacuation of the bowels varying very considerably in the same animal and with the same preparation.

My conclusions in regard to the pharmacological assay are that it is a useful substitute for the chemical assay in the case of many remedies in which the latter is not applicable, and that it permits of a standard being formed for these preparations which is sufficiently constant and sufficiently exact for therapeutic purposes. It is desirable that such an assay should be made in preparations which fail to effect the desired therapeutic result unless given in quantities which act on important organs, and which are liable to give rise to poisoning if unusually powerful preparations are unknowingly dispensed.

In conclusion it may be mentioned that the pharmacopœias already give the authority of their imprint to the use of pharmacological qualitative tests. For in the British pharmacopœia one of the tests of atropin suggested is the dilation of the pupil induced by its application, and although no such test is contained in the U.S.P., yet the descriptions of drugs as bitter or sweet in taste involve a pharmacological experiment being performed upon the pharmacist himself. It seems more difficult to take the next step—the quantitative assay—in the case of the older and more established remedies than in that of newer discoveries, for while few of the galenical preparations on the market are thus assayed at present, no one would care to handle an antidiphtheritic serum whose strength had not been determined in this way. The methods and difficulties are the same in each, or rather, the assay of the galenical preparations may be performed with less likelihood of error and with much greater precision. It may be objected that animal experiment is absolutely necessary in case of the serum, for unless this is done there is no method of showing that an utterly worthless preparation of normal serum has not been substituted. But the same is true in the case of galenical preparations; for there is no question that much of the ordinary fluid extract of ergot is utterly worthless and inert, and this can be ascertained only by pharmacological assay at present. If animal assay is necessary in the case of serum it is equally essential in the case of ergot and other vegetable drugs. The idea of animal experiments in assay is much less foreign



to the medical than to the pharmaceutical profession, for the whole advance in medicine in modern times stands on this basis, and the use of serum has familiarized every one with the results of the method. It is to be regretted, in the opinion of the writer, that the pharmacopœial convention did not consider the question of pharmacological tests more fully, for in excluding them from the next edition it not only rejected the only method of assay in many cases, but also excluded antidiphtheritic serum, which is certainly the most important acquisition to therapeutics in the last quarter of a century. Serumtherapy will scarcely be retarded, but the authority of the pharmacopœia, which continues to include such obsolete remedies as poison ivy and fails to take cognizance of this most important advance in medicine, can scarcely be augmented by the decision. May not such ultra-conservatism be the explanation of the apathy manifested by the medical profession toward the official record of the labors of the convention and its committees?

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## THE ORIGIN, HISTORY AND INFLUENCE OF STATE PHARMACEUTICAL ASSOCIATIONS.

BY JOSEPH L. LEMBERGER, PH.M.

In presenting this paper on the "Origin, History and Influence of State Pharmaceutical Associations," I must apologize for appearing before you and asking of you to listen to what may be offered, for the reason that whatever the writer may be able to perform in his daily routine of busy life, he makes no pretension as an orator or essayist, and it is not his ambition either to so pretend; the worthy and honored secretary of these pharmaceutical gatherings does not agree with me on this question. Submitting therefore as gracefully as possible to the powers that be, we proceed to the consideration of the duty assigned.

State Pharmaceutical Associations have a common origin, the primal motive or aim being to "unite the educated and reputable of their profession, as pharmacists and druggists, for their mutual advancement professionally and commercially."

The American Pharmaceutical Association, for many years prior to the organization of the first State association had, among other objects, a similar aim, and doubtless all State associations caught inspiration for organization from this parent body which could not

adapt its laws to accommodate such wants as the several States might require, for there is such an element as State rights which national laws could hardly be expected to protect, but which the States severally can rightfully hope for as within their own territorial domain. It is a fact that however valuable a membership in the American Association is to the individual, it is also a fact that it is not within the easy province of every pharmacist to attach himself or herself to this national body. Reasons for this conclusion could be readily named. To satisfy their national besetting proclivity for organization when once the thought took on a definite purpose, we find one after another of the States assumed for themselves this right and privilege until nearly every State in the Union has its pharmaceutical association, and to the extent that these organizations keep in mind their province they are prosperous and the mutual benefit, embodied in organization for a common purpose, is advanced.

Good or better pharmacy, high emulation for efficiency of the individual pharmacist, sound legislation for the profession, economic and useful safeguards for matters of trade interests, honorable and fair relations among the craft, and a higher value upon the individual responsibility among that branch of toiling servants for the public, are all among the motives that have led up to the origin of this important organization. Many of the suggestions thus outlined will help us more carefully to enter into the details of the history and influence made and exerted by this federation of the profession, and the fact that all members in the organization may not be strictly skilled pharmacists does not detract in the slightest from such organization under the general name pharmaceutical, as among the most valued allies are found the simple dealer in drugs or their able representatives visiting the trade looking after the commercial side, and others standing for allied interests at this time so numerous and consequent upon the ever-changing conditions in a rapidly expanding commercial country such as we have become.

The history of these associations is as varied as history usually is. Some devote much of their time to the purely commercial side, others largely to the social and others again to the scientific, but we believe the level of activity will ere long be reached when the educational or scientific development will be the possible standard,

with care of course for trade interests and the social side thrown in, as is justly proper for the recreation that a relaxing from business cares so freely welcomes. There is no doubt that organization has tended to unite pharmacists of the several States into closer fellowship, and we find some of the most intelligent, influential and distinguished members of the profession in all the States actively identified, whose influence has largely stimulated earnest study and research, resulting in numerous contributions of valuable information that will take permanent place in pharmaceutical literature, and the records of some of the annual deliberations are akin to veritable pharmacopœias of information.

State associations have by their delegates added to the pharmacopœia revision commissions, they have sent strong appeals to National and State Legislatures, they have framed and caused to be enacted pharmacy laws; in fact, such associations are known to constitute a body, when thoroughly united, making a potent factor in the advancement of the very best interests for our common good, and can be made a still more formidable influence if wisely managed.

We may be pardoned if in the concluding section of this paper—"The Influence of State Associations"—we allow ourselves to associate as our ideal the organization with which some of the audience stand closely connected; the application can well be made general; other State organizations may be as efficient—we doubt whether in personnel or influence they are superior. Early in its history the ambition was to be in touch with all phases of the druggist's occupation, and at one of the earliest meetings it contemplated the formation of a committee on trade interests. The thought was also promulgated that the State Association in its corporate capacity might take a part in the American Pharmaceutical affairs and, as a natural consequence, it and some, if not all our sister organizations, always send delegates to the national bodies. Some of them, and notably the Pennsylvania, are in friendly communication with the Medical Society of the State. The delegates are always welcomed and influences exerted that bring those kindred bodies into closer union, a condition of affairs as we all remember which did not exist to the same extent until recent years. How can we estimate the far-reaching work of such men as Squibb, Rice, Maisch, Trimble and others that could be named, whose memory we delight to

honor; as their volunteer papers were presented to the various bodies in the earlier history, how eagerly we welcomed such well-prepared contributions, and how we remember the pleasure and satisfaction we enjoyed listening to them, or at leisure reading their papers in the annual reports. For some of the State associations we can safely say that their successful organization and existence is due to the care bestowed upon this educational feature. We know that no better prepared scientific papers are presented anywhere than appear in some of the reports of State associations. It has also been observed that many young graduates of the colleges of pharmacy are attracted and become useful and influential members. We can note with satisfaction how helpful the State associations were in formulating and extending a knowledge of the National Formulary—it was indeed mainly through the State Association that the medical fraternity were made familiar with this departure, and some of us remember what faithful service was rendered to the National Formulary Commission.

Can we doubt the usefulness of a free circulation of knowledge as found in many of the reports of the annual meetings? Our mind runs to one of the meetings when elaborate papers embodied laboratory notes by several of the members; a valuable paper on "Commercial Training Courses in Colleges of Pharmacy," by one of the professors. On another occasion we find 60 pages devoted to the report of a Committee on Botany of said State association.

The annual addresses of the presiding officers are usually prepared with scrupulous care, and very few there are which are not most valuable reviews of the past, with up to-date observations and suggestions that do not only entertain but contribute valued information, and not infrequently contain important seed-thoughts for future research.

To one of the State associations is attributed "the great and good work of uniting the pharmacists when all was chaos and confusion"—when each looked upon the other with a feeling anything but gracious, and by the bond created the pharmacists were organized, the Illinois Pharmacy law was passed, and they recognized the fact that pharmacy is not a mere trade but an honorable profession as well.

Among the happiest influences exerted is the cultivation of interstate fellowship; greetings are borne from one to the other by dele-

gates, and sometimes points near the boundary line can be found where meetings are held simultaneously and very pleasant joint sessions of the neighboring States have been held. We remember a very pleasant occasion of the kind held by the Pennsylvania and Maryland Associations, with the prospect of a similar meeting in the near future, and the writer has no doubt but that soon other States will follow. Such meetings, when judiciously managed, can be made influential means for the general welfare.

The skilled pharmacist does not require the influence of the State Pharmaceutical Association to encourage either his practical work or desire for knowledge, as this class finds an ample field in the shop laboratory. The association is, however, honored by their membership, and when thus affiliated the contributions, either by volunteer papers or speeches, are sometimes far-reaching.

Some persons hold the opinion that the influence of State Associations is practically realized in the commercial feature. As an illustration, take any of the numerous plans proposed for correcting some of the latter-day perplexing evils that beset the financial side of the drug business; they are generally well discussed and the result of such consideration usually carries weight to the national bodies that may have final disposition.

There may be danger in making State associations too scientific, of carrying too much commercialism, or of having too much of the social frolic feature; but when we recall that side by side there is a commingling of the grave college professor, the chemist, pharmacist, jobbing druggist or his jolly salesman, the soda-water apparatus, suppository machine or other mechanical appliance representative, all meeting together for the best or most fruitful good time, really having a communion of interests, an equilibrium can be had, and there may not be any necessity for many safeguards.

Let me say in conclusion, that what has been presented in this paper, whilst strictly harmonizing with fact, the State Pharmaceutical Association is nevertheless environed with certain conditions upon which depends the possibility of becoming permanently useful. Their ideal must be kept up to the highest possible standard. Excellent pharmacy and commercial integrity must be the leading aim, so that the unaffiliated of the craft may be attracted, the broken ranks filled, and the hitherto excellent work of State associations perpetuated.

## THE ADULTERATION OF DRUGS.

BY LYMAN F. KEBLER.

Many of the reports bearing upon the adulteration of food-products and medicinal preparations, which come to hand from time to time, are of such a character, that at the time of reading we are almost overawed by the number of sophisticated or adulterated articles reported. Tables are presented which would indicate that from 50 to 75 per cent. of the articles examined are adulterated or spurious. If this is really a correct representation of the facts as they exist we would be compelled to admit that this country must be a veritable happy hunting ground for the manipulator. But upon closer examination it will be found that these reports are "reports of adulterations" in the full sense of the word, and that, when a man starts out to find adulterations, he is usually successful. Taking the whole field into consideration, the author does not believe that these reports present the actual existing condition of affairs.

In the course of some of the writer's notes to the *Pharmaceutical Era*, it was stated, in substance, that while the number of adulterated articles reported is found to be comparatively large, the proportion of intentional adulterations actually met with do not exceed 5 per cent. Indeed, extended experience in examining the vast number of articles that come up for investigation in the actual course of business shows that the adulterations practiced are actually very much less than this. Such a statement may seem somewhat radical, but it is based upon the results obtained in the chemical laboratory of Smith, Kline & French Co., wholesale druggists, manufacturing chemists and pharmacists, Philadelphia, Pa., which firm submits to a strict examination nearly all the products they handle.

The subject of the adulteration of foods and drugs is a well-worn theme. Many able reports have been presented time and again, and the writer believes that such reports have had much to do by way of educating both the druggist and the public, and that adulteration has become minimized more largely as the result of these educational efforts than through legislation. The object of this report is precisely along the former line. It is intended to be educational.

The articles referred to are shown in the exhibit given in connection with this meeting. Specimens are here for the careful exami-

nation of all the members, and full information concerning them will be cheerfully given. It is hoped that all who have the opportunity of doing so will examine them, and that they will in this way, and through what may be said herewith, be better equipped to detect adulteration of articles that may come to them in the regular course of business.

The adulterations herewith described are typical in character of what may be expected to be met with, and more than that it is not deemed necessary to give.

For convenience of reference, the articles described are divided into chemicals, oils, simple drugs and allied products.

#### CHEMICALS.

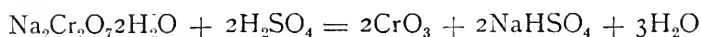
The first subject to be considered is chemicals.

*Ammonium acetate* is quite a difficult chemical to make, especially in warm weather, being very prone to liquefy and even to dissociate. This probably accounts for the fact that an article is frequently supplied which is freely soluble in water and alcohol, having a mousy odor, a melting point of  $82^{\circ}$  C. and a boiling point of  $222^{\circ}$  C. These are the physical properties of acetamide, and acetamide it was. It seems to be the custom of certain manufacturers to deliver this article when ammonium acetate is asked for. No manufacturer is justified at any time, either for convenience or otherwise, to deliver one article for another, even though they resemble each other very closely, both chemically and physically. But in view of the fact that the physiological uses of ammonium acetate are well known, and those of acetamide are as yet obscure such a substitution must be considered high-handed.

*Calcium Phosphate, Precipitated.*—An article of fine physical appearance proved upon examination to contain 30 per cent. of calcium carbonate. The presence of this impurity is not incidental to the manufacture of calcium phosphate, as some one has intimated. Any one using such a phosphate of calcium, for the purpose of diluting powdered opium in manufacturing laudanum, would have no end of trouble before the product is finished.

*"Chromic Acid."*—Quite a number of grades of "chromic acid" are regularly supplied by manufacturers, and unless great care is exercised the purchaser will find himself in possession of an article containing about 40 per cent. of chromic acid and 60 per cent. of

sodium acid sulphate. This product is manufactured by mixing the molecular portions of sodium bichromate, dissolved in a suitable quantity of water, with sulphuric acid, according to the following equation:



The mixture is then simply dried and the product resulting placed on the market as chromic acid. There is considerable variation in the physical appearance in the best grades of chromic acid, and it is easy to be deceived. The only safe plan is to estimate the actual content of chromic acid. A short, rapid method has been worked out by the writer, and will be found in the AM. JOUR. PHARM., 1901, page 395. The presence of sodium is readily established by the sodium-flame test, and the sulphate by means of barium chloride.

*Soluble Blue.*—Ultramarine blue has been supplied when soluble blue was called for, and a great contention was raised when an unfavorable report was submitted. This product is insoluble in water, but care must be taken not to be deceived, inasmuch as the ultramarine blue is a very fine powder and remains suspended in the water for some time. It is best to make up the solution or mixture and let it stand for twenty-four hours, and if the product is ultramarine, the blue will subside and leave the upper aqueous layer perfectly colorless, while a soluble blue under the same conditions will leave a permanent blue solution.

*Podophyllin, Powdered.*—When a request was made that a sample of this material be submitted, it was found upon examination to consist of powdered mandrake root. This fraud is easily established by its insolubility in alcohol and microscopic appearance.

*Tannic Acid, Commercial*—For this article, powdered Chinese nutgalls have been supplied. Any one familiar with the odor of these galls can readily detect this substitution. Commercial tannic acid, furthermore, is nearly soluble in water; whereas, powdered Chinese nutgalls leave considerable insoluble matter. The microscope can be used to advantage with such a product.

*Coumarin.*—A sample of this article was submitted for examination and proved to be of very good quality. Accordingly, a good-sized order was placed, and when the goods arrived another examination showed the material to possess a melting point from  $54\frac{1}{2}^{\circ}$



C. to  $57^{\circ}$  C., while the melting point of pure coumarin is  $67^{\circ}$  C. On heating with a 5 per cent. solution of potassium hydrate at a temperature of about  $60^{\circ}$  C. for an hour the odor of aniline was developed and the addition of a solution of calcium hypochlorite to this mixture gave the blue color reaction characteristic of aniline. On applying Hoffmann's reaction for primary amines the characteristic and disagreeable odor of phenylcarbylamine was obtained, indicating the presence of a primary amine. The percentage of nitrogen was estimated, and on calculating the nitrogen back as acetanilid it was found to amount to 26 per cent.

*Vanillin*.—With this article the same difficulty was experienced, as mentioned above, in connection with coumarin; namely, the sample submitted was of excellent quality, while the consignment of goods ordered from this sample proved to be a substitution. This contract involved several thousand dollars, and at first considerable difficulty was anticipated in getting rid of this substance, which proved upon examination to consist of broken crystals of acetyl isoeugenol, the direct antecedent of vanillin in the manufacture of the synthetic product. The manufacturer, however, took back the goods without a murmur and paid all expenses involved, including the cost of analysis. The interesting point in this connection is, that the melting point of acetyl isoeugenol is  $78^{\circ}$  C., while pure vanillin melts at from  $80^{\circ}$  to  $82^{\circ}$  C. From this it can be readily seen that, had only a superficial examination been made of the goods consigned, they would readily have passed as vanillin, inasmuch as the acetyl isoeugenol had been mixed with a certain proportion of vanillin to give it a distinct vanillin odor. The following methods were employed to establish this impurity: microscopically the crystals were abnormal; with concentrated sulphuric acid a beautiful red color was developed, whereas vanillin gives a lemon-yellow with this reagent; by estimating the per cent. of vanillin; according to the method of Prescott and Hess; modified by the writer and found in the *American Druggist*, March 10, 1899. The solubility was also abnormal, and the presence of acetic acid was established by the conventional methods.

Another sample of vanillin submitted contained 90 per cent. of specially prepared benzoic acid and 10 per cent. of vanillin. This fraudulent product was easily detected by its odor, solubilities and melting point. Acetanilid is frequently met with as an adulterant of

vanillin to the extent of 50 per cent., and is usually identified by the same test as those described above, under coumarin, for detecting this substance.

*Oil of Bergamot.*—On examining a large consignment of this oil, conditionally purchased, it was found to contain an abnormally high,  $+ 28^{\circ}$ , optical rotation, in a 100 m.m. tube. The genuine oil is recorded as never having a higher rotation than  $+ 20^{\circ}$ . In every other respect the oil tested up well, except that the per cent. of linalyl acetate was somewhat low, namely, 28 per cent. A number of adulterants might be added to bring about this abnormality, such as oils of lemon, orange and turpentine; but after taking everything into consideration, the writer came to the conclusion that oil of lemon to the extent of about 20 per cent. had probably been added.

*Oil of Cassia.*—It seems to be a periodical disease with the Chinese men to adulterate this oil with kerosene, and it is not uncommon to find it adulterated to the extent of 20 per cent. The manipulator, unfortunately, however, sometimes makes the mistake of adding more kerosene oil than the oil of cassia will readily mix with; consequently, it has been the writer's misfortune to find oil of cassia to contain a considerable quantity of kerosene floating on top of the cassia oil in an original package. This adulteration has not been met with within the past year, and it is believed that this is chiefly due to the fact that oil of cassia is now largely bought and sold on the basis of percentage-content of cinnamic aldehyde. It is hoped that this practice will be extended more and more in the trade for the purpose of gradually rooting out the adulterations of oils. It may not be possible to eliminate adulterations entirely by such a procedure, but it is certain that it will minimize it, and that is the best we can probably hope to do in a great many cases at present.

*Oil of Copaiba.*—It is not a new thing to tell the members of the American Pharmaceutical Association that balsam copaiba is adulterated with and even substituted entirely by gurjun balsam, but it is doubtful if many of them have met with an oil adulterated with the corresponding oil of gurjun balsam. There are a number of tests given for detecting the presence of this adulterant, and some of them are of service; but the writer, so far as his experience goes, has the utmost confidence only in the following: Into the bottom of a test-tube place 1 c.c. of glacial acetic acid (99.5 per cent.), add four drops of pure concentrated nitric acid and mix well, then add

four drops of the oil to this mixture, allowing the oil to float on top; if oil of gurjun balsam is present, a reddish or purplish zone will be developed between the layer of oil and the acid mixture in a few minutes. No reaction occurs if the oil is pure.

*Oil of Peppermint* is probably one of the most liberally adulterated oils that is met with, and especially is this true in mixing a high-grade oil with an oil of poor quality. Several years ago an oil was met with that showed upon examination to contain at least 25 per cent. of added oil of turpentine. It must be remembered that oil of peppermint is liable to contain a small percentage of terpenes, but no such quantity is admissible, and it also should be said, is quite unnatural. Notwithstanding the fact that this oil contains such a considerable amount of added turpentine, the specific gravity did not fall materially below the recognized lower limit. On reporting this condition of affairs to the vendor he immediately requested the oil to be returned, and he gladly paid all cartage, freight, etc., in addition to \$25 for analysis, without making a protest. This in itself was ample evidence that the article was known to be of a spurious character.

The presence of the turpentine was established by a fractional distillation: the first fraction began to come over at 150° C, and 40 per cent. distilled before the temperature reached 180° C. The specific gravity of this fraction corresponded to that of turpentine, and other physical and chemical properties unmistakably proved this fraction to be turpentine. By allowing 15 per cent. for the possible presence of a natural terpene having a boiling point lying between the above limits, which is quite improbable, we still have left 25 per cent. of added turpentine. Genuine oil of peppermint contains very little material having a boiling point below 200° C. The per cent. of menthol, both combined and free, was also estimated and found to be very low.

It is hoped that the present Committee on Revision will see its way clear to introduce a lower limit of boiling point and a method for estimating menthol. For the benefit of some, the following references to the methods for menthol determinations are given: Schimmel's "Semi-annual Report," October, 1894, page 438; "The Volatile Oils," by E. Gildemeister and Fr. Hoffmann, translated by E. Kremers, page 651, and the AM. JOUR. PHARM., 1897, page 189.

*Oil of Thyme (White).*—It is well known that white oil of thyme

contains very little genuine oil of thyme, but consists for the greater part of oil of turpentine, distilled over some herbs of thyme. For this the consumer is in a measure responsible, in that he demands a colorless article, which the producer is unable to supply in pure quality, because pure oil of thyme will always be more or less darkened in process of time. It is sometimes stated that pure oil of thyme is not available. This is a mistake. All samples, however, should be carefully tested as to the specific gravity and the percentage-content of phenol bodies.

*Oil of Walnuts.*—Some time ago, while in quest of pure oil of walnuts, several parties purporting to deal in this commodity were requested to send samples and prices for the same. One of the samples was marked (concentrated, white), had a sweetish taste, and was soluble in water. This proved, upon further examination, to be nothing but diluted glycerin, flavored with a menthol-like body. Another sample proved to consist of about one volume of oil of mirbane and four volumes of ethyl alcohol. The nature of this mixture was easily revealed by fractionation: three-fourths came over near 80° C., then the temperature rose rapidly to 205° C., which is the boiling point of oil of mirbane, and then the temperature remained stationary until distillation ceased. When it is remembered that oil of walnuts is used chiefly by artists in painting, because it dries with a better film than even linseed oil, the reprehensibility of such an action can very readily be seen.

*Oil of Wine (Heavy and Light).*—Up to the present time we are in doubt as to the probability of the composition of heavy and light oils of wine. The various books describe them as consisting of such and such constituents, but no two of them agree on the same. Merck's Index, 1896, describes them quite specifically as to boiling points and to specific gravities. Every effort has been made through all available sources to obtain what might be considered a good quality of these two oils, and invariably the samples would turn out about the same. One light oil of wine submitted proved to be fusel oil. The lighter oil usually had a lower boiling point and a lower specific gravity than the heavy oil of wine, but farther than this it was impossible to establish a difference, although there must have been some. The conclusion ultimately arrived at is, that the light and heavy oils of wine are undoubtedly obtained in distilling the residue left in the manufacture of ether, the lighter oil

being the first portion of the distillate, while the heavier oil is an intermediate or higher boiling-point product. It would seem that this theme could be taken up to advantage by some one with ample time, whose careful researches might be of extreme value. The present Pharmacopœia does not prescribe any requirements of any value for ethereal oil, excepting specific gravity. The probable reason for this is that no two manufacturers can produce identically the same quality of heavy oil of wine, and the same manufacturer frequently encounters difficulties in his efforts to turn out products of uniform quality. It does seem that a standard for heavy oil of wine should be fixed, especially when it is remembered that it is one of the most important constituents of Hoffmann's anodyne.

#### SIMPLE DRUGS AND ALLIED PRODUCTS.

*Beeswax.*—This is one of the most frequently adulterated commodities met with. In former years adulterations were of a very gross nature, but within recent years it has been manipulated in a very skillful manner. With ceresin having a color and a melting point practically the same as beeswax, it is very easy to manipulate beeswax with this article; but the difficulty does not end here, for the up-to-date adulterator knows that beeswax is at present examined in other ways than simply physical appearance and the application of a few crude tests, consequently he has endeavored to so adulterate the wax that it will comply with nearly all the tests to which this article is usually subjected. By adding a little stearic acid he is enabled to bring up the acid number, which has been lowered by the addition of ceresin, and a little tallow or japan wax will adjust the disturbed saponification number. From this it can readily be seen that he is practically in position to make an artificial beeswax which will comply with the specific-gravity test, acid number and ether number. The melting point can be adjusted by properly selecting the adulterants. There is only one test left us now, and that is the detection of stearic acid by Fehling's method. It should be noted in this connection that we frequently find stearic acid in beeswax, which we have every reason to believe comes from a good source. The reason for the presence of this stearic acid is best explained by remembering that it is not a very unusual thing for beeswax and tallow to be handled together, and accidentally a sample of the latter may find its way into the former. On subse-

quently purifying the beeswax with dilute sulphuric acid, the tallow is saponified with the production of stearic acid and glycerin, the stearic acid finding its way into the beeswax, while the glycerin remains in the liquid portion. Beeswax is also occasionally found adulterated with paraffin and added coloring matter.

*Japan Wax* is an Asiatic product, and several years ago a large importation was made. On arrival of the consignment it was found that the goods were liberally adulterated with corn-starch. It was not evident where the Chinaman was enabled to secure his corn-starch, and, upon investigation, all evidence pointed to the fact that the wax had been manipulated in this country. The added starch amounted to 20 per cent. After the exposure of this fraud very few cases of similarly adulterated material came to hand, and it is quite probable that this fraudulent material had been entirely withdrawn from the market. The starch was readily discovered with the microscope. A ready method for detecting the presence of starch is by applying a few drops of tincture of iodine directly to the wax by means of a pipette, and if starch is present the starch-iodine reaction will manifest itself immediately.

*Aconite Root Adulterated with Tormentilla.*—It would seem on first thought that such a clumsy adulteration as the above would be too apparent for any one to practice. This point we will not gainsay, but an inspection of the samples will convince any one that a hasty examination would not reveal this adulterant, inasmuch as many of the tormentilla roots grow in form similar to aconite root.

*Capsicum vs. Paprika.*—The U. S. and the British Pharmacopœias recognize *C. fastigiatum*, Blume, while the German Pharmacopœia recognizes *C. annum*, L. The latter is generally considered the source of paprika. The U. S. *Bulletin*, No. 13, on "Spices and Condiments," classes paprika as cayenne. It is, therefore, not surprising that many of us are of the opinion that these two articles are one and the same; but a comparison of samples will show that there is a vast difference. The color of paprika varies from scarlet to yellow. As a matter of fact, there are a number of species of capsicum and a host of varieties, all varying more or less in degree of pungency. The degree of pungency and certain particular flavors are said not to be due only to the species but also to the method of cultivation and locality. About a year ago the writer's attention was called to what was considered to be red pepper. An investiga-

tion showed, however, there was a decided difference in physical appearance to begin with between this powdered article and that of the genuine product; the color was considerably brighter, and only about one-sixth as pungent as genuine red pepper. A tincture prepared from it also presented an abnormal reddish cast. On submitting the paprika to a quantitative examination it was found that there is practically little difference between the data obtained for this article and the usually accepted constants for capsicum. A microscopic examination did not offer any assistance.

It can thus readily be seen that with such an article as this the adulterator has in his hands a most efficient diluent of red pepper. That paprika (*C. annuum* L.) should be substituted for *Capsicum fastigiatum*, Blume, is really not new, for Flückiger and Hanbury, *Pharmacographia*, 2d ed., page 452, says: "It furnishes the largest kind of pod pepper and, as we believe, much of the cayenne pepper which is imported in the powdered form." In the "American Dispensatory," 1898, page 434, we find: "It (*C. annuum*) undoubtedly forms a large part of ground red pepper."

*Cochineal (silver and black).*—Pure (black) cochineal is of a purplish-gray or purplish-black color, and it is surprising how few druggists know or have even seen the pure article. It is the general custom to add some white material to the pure cochineal in order to bring out the silvery appearance (sic!) which is so characteristic of the commercial cochineal. The kind and amount of added material varies quite considerable, being, as the writer has found, sometimes barium sulphate to the extent of 30 per cent., talcum, calcium sulphate, calcium carbonate, and magnesium carbonate.

*Elm Bark, Powdered.*—It is a common occurrence to find this article adulterated with wheat flour. As much as 30 per cent. has been met. The microscope will reveal this diluent.

*Jaborandi Leaves mixed with Twigs, Stems and Sticks,* to the extent of 20 per cent. While this probably does not come directly under the heading of adulteration, as it is usually understood, yet there can be no doubt in any one's mind present, that an undue amount of such substances must have been added with a purpose, for it is well known that the addition of such products must necessarily impair the medicinal efficiency of the drug to which they have been added. In the liberal sense of the word, they must be considered adulterants. This is simply an example of many drugs that

are found containing such added foreign material. Frequently as high as from 10 to 30 per cent. of such matter is found in crude drugs. If crude drugs free from such diluents and other impurities and debris cannot be purchased in the open market, garbling must necessarily be resorted to before use. In powdered form it is difficult to detect such impurities. It might also be stated in this connection that roots sometimes contain as high as 20 per cent. of earthy matter. Such drugs are not fit for medicinal use.

*Lactucarium.*—There is no doubt as to what the nature of this article should be. The Pharmacopœia distinctly specifies what is wanted. During the past year when lactucarium was materially advanced in price there was received extract of lettuce when lactucarium was wanted. It seems that anything of this character should be repudiated in the most vigorous terms, because the two articles are so entirely different and distinct that there is no possibility of confusing the one with the other, except for pecuniary gain.

*Rock-Candy Syrup* is probably an article which is used as freely by many druggists as any other commodity they deal in, and it is well known that it generally contains a small percentage of invert sugar, which finds its way into the syrup in the course of its manufacture by atmospheric influences. Certain dealers having knowledge of this thought that a little more reducing sugar would not do any harm, and consequently, when rock-candy syrup was ordered, they supplied glucose of the same specific gravity as the rock-candy syrup usually furnished. A superficial examination might not have revealed the nature of this fraud, but it is easily detected by the application of Fehling's solution, or placing a suitable quantity of the syrup into a porcelain capsule, then evaporating on a steam or water bath. A glucose syrup will simply assume a heavier body, while pure rock-candy syrup will dry completely, with either distinct crystals or crystalline crusts, or both.

*Venice Turpentine.*—There are at present at least three articles on the market which pass under this name. One is the genuine Larch Venice turpentine; another is an imported artificial product, and the third is a domestic artificial product. The genuine article brings quite a good price, and being of such a composition that it is very difficult to get at the actual component constituents, the adulterator has worked along the lines of substitution so skilfully as to be able at present to imitate the genuine article very closely at a very much



lower cost. Certain data have, however, been worked up in connection with pure Venice turpentine, which up to the present time the sophisticator has not been fully able to comply with. The writer is at present collecting certain data upon this question and hopes to make them public in the near future. Some useful information will be found in the AMER. JOUR. PHARM., vol. 73, page 198, 1901. The artificial product consists for the most part of specially selected rosin dissolved in oil of turpentine. Another article has also been met with which had a decided fluorescence, and proved upon investigation to consist of rosin or allied bodies dissolved in a fluorescent rosin oil, mixed with a little turpentine.

*Gum Acacia.*—On looking over the various price-lists we find that there are at least five distinct varieties of this gum, varying very materially in price. There are only the following conclusions to arrive at, namely: The lower grades of acacia are spurious products or they are gums of an inferior quality. The latter is probably the correct explanation, inasmuch as we find upon examining the various grades that there are very few which will stand the Fehling test. This test indicates that there are associated with these poor gums certain substances which ought not to be present in a first-class article. The point naturally presenting itself in this connection is, How are we to decide whether a sample of a gum of acacia submitted is of an A No. 1 quality, or whether it contains more or less of the selected portions of the inferior grades or other gums? Chemical tests practically fail us. To be sure, we have the ash test, the optical rotatory power, the ferric chloride-solution test, the relative viscosity, etc., but after applying all these tests and asking ourselves this question, is the sample submitted genuine gum arabic? we are compelled to say we do not know. The writer is inclined to believe, from the fact that there is very little gum acacia which will not reduce Fehling's test solution, at even a slightly prolonged elevated temperature, that very little A No. 1 gum acacia is found in the market. The various grades are probably differently selected gums from the same or similar sources.

*Gum Tragacanth* shares the common fate of gum acacia, inasmuch as the best quality is about twice as expensive as the lower grades, and with this article we are practically unable to do anything relative to deciding between the inferior and the superior product. There do not seem to be any marked differences except physical

appearance and the viscosity test between the expensive and the cheaper articles. It can readily be seen, therefore, that the one is liable to be substituted for the other, especially in powdered form, in cases where the greatest care is not exercised by the purchaser.

*Gum Kino*.—During the past few years the official product appears to have been in the hands of a monopoly, and an article has been supplied occasionally which represented the genuine very closely. In fact, there appeared to be so very little difference between the genuine article and that supplied that it was necessary to resort to chemical analysis in order to differentiate between them. One sample, nevertheless, complied with the usual tests so closely that it was impossible to find a point of distinction, except that the fresh official product possessed a slight aromatic odor which the sample supplied did not have, but this cannot be considered a distinguishing feature, inasmuch as all gum kinos will lose their peculiar aroma in process of time. This sample contained even more tannin and was more readily soluble in alcohol and in water than the pharmacopœial article, as the following results clearly show :

Kind.	Ash, Per Cent.	Insoluble in 95 Per Cent. Alcohol.	Insoluble in Water.	Per Cent. of Tannin.
True	1.48	8.20	31.04	51.07
"	0.84	10.54	26.88	43.91
Unknown	1.14	7.08	1.16	57.26

The sample marked "unknown" is the one referred to above.

*Aloes*.—It is well known that the various kinds of aloes are substituted one for the other, and it is quite unnecessary to make much comment in this connection. Very little Barbadoes finds its way into commerce. That which is labeled as such and put up in the usual Barbadoes package is conceded to be for the most part pure Curacoa. There are reasons for believing that Curacoa is also sold for the other kinds of aloes. We may be in a position in course of time to be able to apply tests which will distinguish between these several varieties, inasmuch as very extensive chemical investigations are at present being made on the composition of these gums.

*Gum Asafœtida*.—The poor quality of asafœtida has during the past few years been brought up on a number of occasions. It is referred to here simply to give additional testimony to the inferior quality of the article as usually supplied to the trade in this

country. The adulterants are chiefly calcareous rocks and other earthy matter.

The reader has undoubtedly noticed, in going over the above results, that gross adulterations are very little practiced at present. In closing this paper the writer wishes to leave impressed upon every mind one last thought, viz., adulterations at present are generally carried on in such a way that they are not, in most cases, perceptible to the naked eye, and it is necessary to resort to the test tube, the analytical balance, the microscope and the polariscope, before positive conclusions can be arrived at. It therefore behooves every druggist, who is not in a position to carefully examine his own goods, to secure them from such dealers or manufacturers as are known to carefully and conscientiously investigate the commodities they handle.

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## VAN KETEL'S RESEARCHES ON ALKALOIDAL CONTENTS OF CINCHONA BARK.

By J. B. NAGELVOORT.

Ever since the preparation of galenicals passed from the realms of the medical kitchen to the pharmaco-chemical laboratory, and stringent requirements of establishing an opinion in accordance with the results of the analytical balance came in use, cinchona-bark assays have been improved upon. One has only to look at the financial value and pharmaceutical importance of the sales of the bark at Amsterdam and the regular tri-monthly Reports of the Director of the Cinchona plantations published in the *Ned. Tijdschr. Voor Pharm. Chem. en Toxic.* ('s Gravenhage, Geb's Van Cleef) to be convinced.

At the request of this author it affords me much pleasure to call the attention of the American readers to the important contribution on this subject from his pen, whereby I take the liberty to simplify some directions and, to a certain extent, compare<sup>1</sup> results with my own. Analytical chemists are, as a rule, not overburdened with much leisure time, neither can they often command the mental quiet, which is necessary for original work, to conduct

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<sup>1</sup> "Alkaloid-gehalte in Kinabast," door B. A. Van Ketel. Overgedrukt uit *De Indische Mercur*, Van 2 Juli, 1901. Amsterdam: J. H. De Bussy, 1901.

such tedious experiments as Van Ketel offers us here.<sup>1</sup> We are to the contrary, however, usually in more favorable conditions to verify processes on industrial conditions than the apothecary.

H. M. Gordin published, recently, on page 224 of the *Archiv d. Pharmacie*, Band 239-3-1901, also a method of estimation of the total amount of alkaloids in cinchona bark, based upon an exhaustion of the finely pulverized bark (fineness not given) with alcohol, acidulated with HCl, comparing this process with the well-known Prollius method, see Lyons' Manual "page 120, No. 213, employing 10 (ten) gram drug and titrating; both latter peculiarities (10 gram drug and titration) seeming objectionable to me (J. B. N.) where a rich bark of an unknown percentage of quinine, cinchonine, cinchonidine and amorphous alkaloid is under examination.<sup>2</sup> The author would oblige a good many readers of the *Archiv d. Pharmacie* if he had quoted *where* one could verify "nach meiner allgemeine Methode."<sup>3</sup>

Van Ketel criticizes at length the known methods of determining the amount of alkaloids in cortex cinchonæ, of different varieties and species, for which the reader is referred to the original article.

Improving upon all of them he proceeds as follows:

(1) 4 (four) gramme airdry No. 80 powder (the original quotes, of course, Dutch requirements of fineness; *e. g.*, B., 40) is triturated with 2 (two) gramme slacked lime to a homogeneous mixture. To this is added, in small quantities at the time, 4-5 (four to five) c.c. Ammonia water of 0.96 S. G. and the whole mixture is brought to a moist but still non-adherent powder.

(2) Transfer this to a flask of about 300 (three hundred) c.c. capacity; add 150 (one hundred and fifty) c.c. ethylic æther and boil the mixture of bark, lime and ammonia during half ( $\frac{1}{2}$ ) an hour on a safety water-bath, using hereto an upright bulb condenser or a Soxhlet cooler. Shake from time to time, if the mixture is not stirred enough by the boiling process itself.

<sup>1</sup> Linde's "Ueber das Ausziehen von drogen zum Zwecke der Alkaloidbestimmung" must not be forgotten.

<sup>2</sup> See also, "Die Pflanzen-Alkaloide" von J. W. Bruhl Braunschweig: Vieweg, 1900, page 162.

<sup>3</sup> I have before me samples of Cort. cinchonæ S. containing respectively 3.2 per cent. and 1.9 per cent. Quinine S.

(3) Cool and filter into a separatory funnel of the required size, through a small plug of cotton, previously arranged as to its filtering capacity, into the stem of the funnel. Wash funnel and cotton-plug with "æther," as long as a control proof with an alkaloid group reagent (Mayers or Wagner's) shows the necessity for it. It is economical to have a small-sized "Erlenmeyer" arranged as washbottle.

(4) Shake the ethereal fluid once with 10 (ten) c.c. of 10 (ten) per cent. HCl. Separate this into another separatory funnel and repeat this operation, gradually taking smaller quantities and less strong acid, as long as is necessary to exhaust the æthereal fluid. Verify this as usual.

(5) Save the ethylic æther, to be recovered by distillation.

(6) Add about 50 (fifty) c.c. fresh ethylic æther to the aqueous acid solution of the alkaloids contained in the second separatory funnel. (This quantity will, in nine cases out of ten, redissolve all the alkaloids eventually to be set free. But it is well to bear in mind that cinchonine is not very soluble in ethyl-æther.)

Make alkaline with the required amount of a 10 (ten) per cent. NaOH solution. Verify alkalinity by a (small) piece of red or neutral litmus paper. Keep this small piece of litmus paper in the fluid. Rotate until the ethyl-æther is clear. Don't shake. Allow the different fluids to separate. Tap off the aqueous layer into another separatory funnel and wash the æther with small quantities (2-5 c.c.) distilled water, as long as this is alkaline to (red) litmus (paper). Repeat the shaking out of the alkaline fluid, with 25 c.c. fresh æther; add this to the previously collected.

This second exhaustion yielded me an increase of 0.022 gramme on 0.152 gramme obtained by the first agitation—over 12.5 per cent. of the total amount alkaloid.

Tap off now the ethereal fluids into a tared Erlenmeyer (of Jena glass and of such size as will be necessary for the amount of ether used in S 6, previously fitted with a good cork and distilling tube) distil the æther from a safety waterbath, of which the temperature must not exceed 50° C. (the author lays stress upon the fact that the æther will "bump" sometimes, for which there is no necessity) or on an iron plate, warmed by an electric current, or submerge the tared Erlenmeyer into water previously heated to about 40 to

50° C., distil and dry residue in a water-oven to constant weight,<sup>1</sup> weigh and calculate to percentage.

Experiments conducted by Van Ketel proved that cinchona bark was exhausted of its alkaloids in half ( $\frac{1}{2}$ ) an hour.

One hour is therefore a sufficient time to finish an assay of a cinchona bark by this method, which recommends itself, too, for its economy in the use (recovery) of ethyl-æther.

Fineness of Powder No. 60.		Fineness of Powder No. 80.	
Time of Boiling.	Per Cent. of Total Alkaloid.	Time of Boiling.	Per Cent. of Total Alkaloid.
10 minutes . . . . .	{ 6.06 6.1		
15 " . . . . .	{ 6.22 6.24		
20 " . . . . .	{ 6.46 6.45	20 minutes . . . . .	{ 6.55 6.5
25 " . . . . .	{ 6.47 6.5	25 " . . . . .	{ 6.5 6.54
30 " . . . . .	{ 6.54 6.48		

Results of an experiment carried on with a richer bark (9.3 per cent.).

Time of Boiling.	Per Cent. of Total Alkaloid.
5 minutes . . . . .	{ 8.48 8.40
10 " . . . . .	{ 8.76 8.76
15 " . . . . .	{ 9.05 9.11
20 " . . . . .	{ 4.32 0.99
25 " . . . . .	{ 9.29 9.31
One hour . . . . .	{ 9.30 9.32

Experiments have proven that the addition of ammonia water to the bark-lime mixture makes a material difference in the results.

The bark previously assayed on 6.5 per cent. total alkaloid, in No. 60 powder, mixed with the slacked lime only, yielded to boiling æther, 5.75 and 5.79 per cent.

<sup>1</sup> I recommend Gordin's suggestion, which he renewed in *Archiv d. Pharmacie*, 239, 3, 1901, page 217, to submit the marc to a new assay, as best evidence for the exhaustion of a drug; have followed this method with the best satisfaction already for sometime. Duplicate analyses may have an error in common, and do have one sometimes.

Contact with lime for an hour makes no difference in the quantitative results.

Neither does more water added to the slack lime (more than the mixture becomes through the use of ammonia water) make a difference.

But the quantitative results were alike to the previously obtained, when No. 80 powder was used.

In other words, the fineness of the powder is of the utmost importance for success with the lime-æther method. Results, 6.5 and 6.48 per cent. Strange to notice, this failed by the richer bark. Lime and æther extracted only :

	Per Cent.
In 30 minutes . . . . .	{ 7.74 7.78
In one hour . . . . .	{ 8.25 8.22
In an hour and a half . . . . .	{ 8.25 8.26

The well known process of shaking out in the cold in an automatic shaker (as was recommended in the *Pharm. Journal* for March, 1892) yielded from the bark containing 9.3 per cent. total alkaloid, after three hours' shaking; 9.22, 9.24 and 9.19 per cent., and from a bark found to contain 8.24 total alkaloid after an hour boiling 8.31 per cent.

Where the care for safety in boiling with æther requires too many precautions, this shaking method has a right of existence. (Compare Lyons' "Manual," 1899, page 114, No. 203.) Referent obtained very good results from the shaking, automatically, in the cold, from a mixture of chloroform, petroleum-æther and ammonia, but it takes longer time and requires "machinery" of some kind. In a shaking apparatus one can have, however, half a dozen or more samples at the same time in operation. Each method has therefore its own merits; Van Ketel's is certainly the cheapest, using only common apparatus.

But the unusual large quantities of ethylic æther (unusual and not needed in our assay work) stand, in my opinion, in the way for a general adoption of Mr. Van Ketel's process. The author employs about 300 (three hundred) c.c. Filtering æther and washing with æther are also not recommendable features. Referent did not find it necessary to filter. The heavy mixture of bark and lime

leaves a clear top fluid, which can be decanted, without a floating particle going with it, while I had no difficulty neither to deprive the marc of some alkaloid remaining.

No more than three quantities of 15 c.c. æther were needed. After this washing, no alkaloid could be detected, when the residue was transferred to a funnel, whose stem was previously plugged up with a small quantity of cotton. Pressure with a cork and evaporating of the æther obtained thereby did not give any evidence to Mayer's reagent. But since as stated satisfactory quantitative results were obtained by substituting petroleum-æther, fractioned at 40°, for ethylic æther, Van Ketel's process might advantageously be modified in this direction; let us keep this in mind.

Cort. cinchon. succ. in No. 60 powder.

Modified "Prollius" according to Lyons.

A mixture of 2 (two) vol. petrol. æ. (B. pt. 40°) and 1 (one) vol. chloroform + 10 c.c. ammonia water of 0.96 s.g.

Yield 5 per cent. tot. alks.

Yield 5 per cent. tot. alks.

3 (three) vol. petrol. æ. to 1 (one) chloroform yield *lower* results.

Very peculiar and unexpected results were obtained when boiling with "æther" was continued longer than previous experiments called for. The 6.5 per cent. bark yielded after an exposure of one hour and a half, 3.38 per cent.

The 8.31 per cent. bark yielded already after half an hour only 6.15 per cent. Van Ketel offers as an explanation for this the theory that the variable proportions of cinchotannine in the bark are the cause of it, and that a strong base as lime must be present, in excess, to prevent the alkaloids forming in æther insoluble compounds with cinchotannine. This not-to-be ignored fact will be a continually recurring source of errors and disappointments, and a very unpleasing feature of the process, I am bound to state. But the situation has to be accepted, however much we would like to make chemistry a science of mathematical accuracy.

The author finally offers a series of figures to prove the value of a true representative sample, *e. g.*, that the whole of the sample must be reduced to a uniform fineness and not a part of it left unpowdered. And offers evidence that careless pulverizing and sift-



ing, whereby fine dust is lost, will yield higher results than the conditions actually are. Since this is exemplified by an article with which the average American pharmaceutical chemist comes very seldom, if ever, in contact, namely, *Ledgeriana* root bark, Van Ketel's figures might follow (De Vrij proved years ago that some root bark is even richer in alkaloid than stem bark). I have before me a root bark containing 10 (ten) per cent. total alkaloids.

Cort. cinchona succ. *ledgeriana* root bark, containing 7.67 per cent. total alkaloid, yielded from

	Per Cent.
First sifting . . . . .	5.66
Second " . . . . .	6.94
Third " . . . . .	7.43
Fourth " . . . . .	7.9
Fifth " . . . . .	8.53
Sixth " . . . . .	8.8
Seventh " . . . . .	8.9

Referent had a few good opportunities to test it if the new method would oblivate the tried older ones.

A cinchona bark was offered for sale warranted to contain 11 (eleven) per cent. total alkaloid.

Repeated assays yielded only a little over 6 (six) per cent., by shaking out, as well as by maceration with "*Prollius*." *Boiling* with ether, according to Van Ketel, *continually chequing throughout the whole process*, yielded 4 (four) per cent. Duplicate analysis of another to No. 60 powder reduced bark, said bark offered for sale as containing 8 (eight) per cent. total alkaloids, had given me, by the shaking method in the cold, with "*Prollius*" respectfully, 5.6 and 5.7 per cent. According to Van Ketel's method—rotating the flask containing the boiling mixture every five minutes; proving the exhaustion of the dregs from adhering alkaloid; washing the alkaline fluid (6) twice with æther, I obtained 4.35 per cent.

This is of course a very limited experience, but not an encouraging one, after all the labor and the care. I hope sincerely that some one may fare better than I. The author will certainly allow me to emphasize that his process has to go on without being interrupted, or there will be danger that cinchonine crystallizes out in the separator, which would, of course, give unreliable results.

NEW ORLEANS, LA., Oct., 1901.

## THE SUGAR-COATED PILL.

BY WM. R. WARNER, JR.

In itself a pill does not present a very weighty or complex subject for discussion or essay, and yet, what a boon the sugar-covered variety has proven to the peoples of the earth. "'Tis a bitter pill" was spoken of ye old time pill, and how true the saying! For several centuries all sorts, sizes and conditions of pills and boluses, unsightly, bitter and nauseating, were made and poked down the throats of the unwilling patients.

It was not until 1856 that the really scientifically prepared and inviting sugar-coated pill was manufactured and introduced in America by Mr. Wm. R. Warner, at that time retail apothecary, located in Philadelphia, who had spent much time and thought upon the subject, and finally gave to the world his conception and its results.

It is a well-established fact that the first results were not productive of the elegance afterwards attained, but the path was opened and the profession had at their command, in the hands of their pharmacists, a product which was not only pleasing and palatable to their patients, no matter how nauseous the constituents of the pill, but which might be fully depended upon for expected therapeutic effects.

Such conditions did not come spontaneously; they were rather the result of the intelligent and exhaustive research and experimentation, aided by a master-mind and a thorough technical knowledge of pharmaceutical chemistry.

A sugar-coated pill, properly made, should combine the following important points:

A careful selection of the drugs entering into its composition. "In Medicina Qualitas Prima Est." An accurate subdivision of the medicament employed. Rapid disintegration after its administration. The use of such excipients in the preparation of the mass as will not be incompatible with its chemical construction, and finally the application of a coating which must be fully and freely soluble and yet protective of the inner pill or mass, so as to insure its continued activity and full therapeutic value, even though it be kept on hand indefinitely.

Such a pill really possesses decided advantages over the ordinary pill of the shops, extemporaneously prepared, in that the minute

division of powerful chemicals is more readily and accurately reached through the processes and facilities specially invented and used for the purpose.

Thus we have the ready prepared, sugar-coated pill of to-day as properly made; and notwithstanding the fact that the "old reliable" has been assailed by coatings of other descriptions and preparations of other shapes, we believe it is destined to outlive in average popularity any and all of its competitors.

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## SUGAR-COATED PILLS.

BY THOMAS S. WIEGAND.

This subject may be considered stale by some, as sugar-coated pills have been before the public for so many years; the first of these that acquired much repute in this country were those imported from France and made by Garnier Lamoreau & Co. some fifty-five or sixty years ago, and were very beautiful specimens of the confectioners' skill; but very many physicians of high standing and excellent judgment ignored them entirely, as the result of their experience induced them to think the process of sugar coating "baked" them so thoroughly that they were nearly insoluble. Knowing this objection it early became a problem with me to remove any cause of complaint arising from this coating process by excluding all heat from them while being coated, and the method of doing it was simply to drive a current of cold air into the pan while the pills were being covered with the sugar; another reason, and a better one in my judgment, why some sugar-coated pills were not so active was to be found in the fact that many of them contained less than half the quantity of the medicinal agent they purported to have—thus, in one instance, five 5-grain blue pills weighed with their sugar coating little over 15 grains, while their medicinal component should have weighed 25 grains and the sugar coating would add almost as much more to their weight.

That sugar-coated pills should be objected to when properly made is to my mind altogether unreasonable; but it must be remembered that, like all other remedies, the purity and activity of the materials used in their composition must be the first consideration; yet the unscrupulous manufacturer has the opportunity of hiding very poor drugs under a very handsome coating of sugar flavored with some

aromatic that will cover up a want of the true remedy that ought to be the chief constituent. Then, again, every well-informed and experienced pharmacist knows that the compounding of pill-masses requires much care and judgment in the methods of manipulation and the selection of excipients which will make the "mass" a good one to work and still remain in good condition even when long kept—these two points being accepted as indisputable, the coating of the pill must be done with such materials as will not be insoluble in the juices and acids of the stomach. The materials employed are gum arabic, starch, small quantities of wheat flour, and sugar in form of syrup. A quantity of pills are placed in a "pan" which rotates in a very peculiar way quite different from the confectioners' steam-coating pan, and a small quantity of syrup about half the density of simple syrup is poured on them, the whole mass of pills rolling in the pan soon becomes moistened and while moist a quantity of gum arabic is thrown in and a light coating of gum is thus given them, all unnecessary gum is removed and the sugar coating begins with an amount of syrup in which is mixed a little flour and enough finely powdered starch to render it opaque. The pills soon become sticky and form into a mass which must be stirred rapidly by the operator to set them free, and then they begin to roll around in the pan each as an independent body, they must then roll until quite dry when the process is repeated—each successive coat rendering the pill whiter and rounder. When they are well covered then plainer syrup, that is, one containing less starch, is used, and as they become smoother plain syrup is used, after a time thinner syrup is used, and finally less and less will be required to moisten them. So fine a surface is at last imparted to them that 100,000 pills will become moist with the addition of two or three tablespoonfuls of syrup. This is practically all that can be written about the subject. The success of making a fine-looking lot of sugar-coated pills is to be learned only by working at the pan until you can do it.

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ADULTERATION IN ENGLAND.—The report of the Local Government Board shows (*Chem. and Drug.*, 1901, 650) that the total number of samples of foods and drugs analyzed in 1900 was 62,858; the analysts reported against 5,503 of the samples examined; proceedings were taken in 3,321 cases; and penalties were imposed in 2,673 of these.

## COLOR REACTIONS OF CERTAIN COAL-TAR DERIVATIVES AND MORPHINE WITH FORMALDEHYDE AND SULPHURIC ACID.

BY ROBERT A. HATCHER, M.D.

A description given in a recent journal of the reaction occurring between formaldehyde-sulphuric acid and several coal-tar derivatives, salicylic acid and its compounds, resorcin, creasote and carbolic acid, resulting in a purple color, so closely agrees with that of the color produced by the reaction between this reagent and morphine (Kobert) as to cause possible confusion. If the reactions were so similar, as would seem from the description, this test would have but a limited value in the case of morphine.

A reaction similar to that mentioned in the case of coal-tar derivatives is given by the formaldehyde-sulphuric acid and aspirin (acetyl-salicylic acid), and is ascribed by Thoms (*Pharm. Ztg.*, XLVI, p. 553) to the phenol residue of salicylic acid.

In order to decide whether the reaction with morphine is distinguishable from those afforded by the substances mentioned, a number of comparative experiments were made. An alkaline solution of carbolic acid (I) was taken, and for the sake of more accurate comparison the same amounts of sodium hydrate and sulphuric acid were used in the morphine solution (II) and in that of carbolic acid and morphine (III).

The reagent is made, according to Kobert, by mixing 5 c.c. of formaldehyde (40 per cent) with 100 c.c. of sulphuric acid. The colors were compared with a sample-card of the Diamond Dye Company.

The following six substances were used, the results being found in the table below:

I. .1 gm. Carb. acid + 5 c.c.  $\frac{N}{10}$  NaOH warmed and 10 c.c.  $\frac{N}{10}$   $H_2SO_4$  added.

II. .01 gm. Morphine sulphate + 5 c.c.  $\frac{N}{10}$  NaOH + 10 c.c.  $\frac{N}{10}$   $H_2SO_4$ .

III. .1 gm. Carb. acid + .01 gm. morphine sulphate + 5 c.c.  $\frac{N}{10}$  NaOH warmed, and 10 c.c.  $\frac{N}{10}$   $H_2SO_4$  added.

IV. .1 gm. Sodium salicylate (com'l) + 50 cc.  $\frac{N}{10}$   $H_2SO_4$ .

V. Sodium Salicylate C. P.

VI. Salicylic acid C. P. (dissolved in q. s. alcohol .

The first and third were evaporated to small quantity in order to try the effect of heat in liberating carbolic acid after warming with an alkali, the second was similarly heated for the sake of uniformity of treatment. In each case a drop of the solution was added to five drops of the formaldehyde-sulphuric acid.

I.	II.	III.	IV.	V.	VI.
<i>Cold.</i>	<i>Cold.</i>	<i>Cold.</i>	<i>Cold.</i>	<i>Cold.</i>	<i>Cold.</i>
Crimson to cherry, deepening to garnet on standing.	Maroon, deepening on standing.	Deep crimson, inclining to garnet.	Faint pinkish salmon.	None.	None.
<i>On Heating.</i>	<i>On Heating.</i>	<i>On Heating.</i>	<i>On Heating.</i>	<i>On Heating.</i>	<i>On Heating.</i>
P'p't which is maroon.	Bleaches to dirty brown.	Brown, maroon tint.	Rose-pink.	None, except upon edges of vessel, where superheated, a fleeting rose-pink.	Same as V, save that the color was even more fleeting and a strong odor of oil of wintergreen was noticed.

Of course, free carbolic acid can be dispelled at a temperature below that required to decompose morphine, and from experiments not tabulated above, it is found that much of it may be dispelled from alkaline combination by evaporating for some time with strong sulphuric acid. We may conclude that the formaldehyde-sulphuric acid is a reliable test for morphine, but that it is well for one to become familiar with the reactions given by the substances mentioned, otherwise an error is quite possible; and if these substances are present it would be well to remove them by some method, such as agitation with ether after acidulation, whereby the morphine is left behind.

CLEVELAND, OHIO.

## A METHOD FOR FILLING CAPSULES WITH ESSENTIAL OILS.

BY WILLIAM G. TOPLIS.

The extemporaneous preparation of capsules containing considerable quantities of fluid, such as volatile oils, has never been quite satisfactory.

To seal the contents in soft capsules requires too much time and preparation for prescription dispensing. Attempts to seal on the

covers of hard capsules may succeed ten, eleven, and possibly twelve times in a dozen, but there is a strong probability that one at least will leak.

The addition of inert absorbent material ordinarily results in the production of a mammoth. The last measure, however, has some advantages over the others: it is speedy, convenient, and quite in line with the usual practice of the prescription department. Provided the great bulk could be prevented, this plan would be, perhaps, the most acceptable for the purpose.

It is with such procedure in mind that I invite your attention to the peculiar behavior of starch as an absorbent in this connection. The following prescription comes to me frequently:

R<sub>x</sub>. Terebene    ʒss  
Ft. Cap.    xii.

To prepare this, simply weigh out one-half drachm potato starch, place it upon the pill tile, pour the liquid upon it, and with a spatula intimately incorporate. The result is a very thin flowing mixture, altogether too fluid to handle. Now add three or four drops of water and stir briskly, at once the mass begins to stiffen. Again add a few drops of water, with stirring as before; repeat if necessary until the mass becomes quite solid. It may now be formed, by aid of a couple of spatulas, into a rectangular figure, and subdivided into the requisite number of parts. This method seems to be quite satisfactory, as it is possible to dispense the prescription in capsules not larger than number three.

Arrow root answers as well as potato starch, but more powder is necessary, nearly twice the weight being required; still, even with this addition, it is possible to put the prescription into twelve No. 2 capsules. The arrow root is considerably heavier bulk for bulk. It is possible to dispense such a prescription within ten minutes. The greasy box is impossible, and the first objection to this method has yet to be recorded.

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## NOTE ON THE ESTIMATION OF BERBERINE.

BY H. M. GORDIN.

In a previous paper<sup>1</sup> I have given two methods for the quantitative estimation of berberine. In both these methods the ber-

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<sup>1</sup> Papers read at the meeting of the A.Ph.A., 1901, Sept. 23, *Arch. d. Pharm.*, 1901, 638.

berine is extracted from the drug by means of hot alcohol. In the first of these methods the alcoholic solution is made up to a definite volume, filtered and in an aliquot portion of the alcoholic filtrate the berberine precipitated as an acid sulphate which is afterwards converted into the monoacid hydriodide. In applying this method to various drugs it was found that whereas in some of them, like *Hydrastis canadensis*, the berberine exists in a form that is easily soluble in alcohol; in others, like some samples of barberry bark, the alkaloid seems to exist in a form which is very difficultly soluble in cold alcohol, so that it is impossible to make up the alcoholic extract with cold alcohol to a definite volume without leaving some berberine in the residue. It is therefore important, whenever the first method of estimation is used, to take care that no berberine containing residue be left.

Should there be a sediment in the alcoholic extract, which does not dissolve in cold alcohol, even after repeated washing with this solvent, the sediment should be dissolved in water, filtered with a little talcum, if necessary, and the clear filtrate tested for berberine by one of the methods which will be given in the next paper. If berberine be found in the sediment then the first method of estimation is inapplicable, and the second method, which is applicable to all cases, must be used.

With regard to the precipitation of berberine by potassium iodide, further work upon this subject has shown that, whereas in a neutral solution berberine is as completely precipitated by an excess of potassium iodide, as it is by Mayer's or Wagner's reagent, in the presence of free acid the precipitation by these latter reagents is more complete than by potassium iodide. It is therefore best to substitute Mayer's reagent as a precipitant for potassium iodide in the above-mentioned first method, in which acid is set free by the reaction.

That the reaction is the same whatever neutral precipitant be used, was shown in another paper,<sup>1</sup> where, on adding standard acid to a neutral solution of berberine hydrochloride and precipitating the alkaloid with either of the above-mentioned reagents, no acid was consumed, showing that even in the presence of free acid, ber-

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<sup>1</sup> *Arch. d. Pharm.*, 1901, 629. Read at St. Louis before the A.Ph.A., 1901, Sept. 23d.



berine is always precipitated along with only one molecule of hydriodic acid by these reagents.<sup>1</sup>

Another improvement in the first method consists in collecting the berberine-acid sulphate upon a plug of cotton in a funnel, washing the vessel in which the precipitation took place twice, with a mixture of equal parts of ether and alcohol, using 5 c.c. of this mixture each time, and then thoroughly washing the vessel and the acid sulphate in the funnel with ether. The acid sulphate being completely insoluble in ether, as seen by the absence of color in the ethereal washings, the last traces of sulphuric acid can be washed away by using a considerable amount of ether for washing without increasing the correction to be added to the final results. The only correction that has to be made is for the constant amount left in the mother liquor. As to the 10 c.c. of ether-alcohol used for the first washings, the amount of berberine left in them can be entirely neglected, as this amount is less than 0.0006 gramme. In working upon 5 grammes of drug this would affect the result only to the extent of less than 0.012 per cent.

LABORATORY OF WM. S. MERRELL CHEMICAL CO.

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## GROUND FLAXSEED ADULTERATED WITH MINERAL OIL.

BY LYMAN F. KEBLER.

The addition of mineral oil to linseed oil has frequently been practised and is well known, but the adulteration of ground flaxseed with this article is of recent origin. A little less than two years ago Mr. E. H. Gane<sup>2</sup> reported that he had met a flaxseed meal which contained the pharmacopœial required 25 per cent of fixed oil, but found that the oil was not saponifiable. Further investigation showed that the natural oil had been removed, and its place supplied by a petroleum oil of about the same specific gravity as linseed oil. Nothing more was heard of this fraudulent practice until within the last few months when a British journal informed us that an ingenious method of sophisticating linseed meal was being

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<sup>1</sup> That the substance under operation was the neutral berberine hydrochloride was shown in that same paper a few pages further on.

<sup>2</sup> 1900, *Am. Drug.*, 36, 4.

practised. This consisted in expressing the natural fixed oil from the crushed seed, and triturating the resulting cake with petroleum oil of about the same density as linseed oil. Such a mixture was then placed on the market as "pure crushed flaxseed." Following closely upon this, the writer was told that considerable of this mineral oil adulterated flaxseed meal was being handled in our markets. An investigation was immediately made, and it was found that the report was well founded, as the following results will show.

A sample of ground flaxseed was secured and the per cent. of oil estimated by exhausting it with carbon disulphide in the usual way. This indicated the presence of 35.5 per cent. of fixed oil, which is good for this product. It is, however, not more than a high grade flaxseed usually contains, but physically the meal was abnormally oily, and possessed a foreign odor and taste. The word "meal" as used here means pure ground flaxseed and not the flaxseed meal from which the oil has been expressed. An examination of the extracted oil showed that there was an undue amount of unsaponifiable matter present. A considerable quantity of the above ground flaxseed was then secured, one portion exhausted by means of pure ether; from another portion the oil was removed by hydraulic pressure, and a third portion was reserved for future use.

The oil obtained by hydraulic pressure, of which a sample is submitted, is highly fluorescent, dark in color, and abnormal of odor. Pure raw linseed oil expressed in the cold (as the above was) possesses a golden yellow color, while that obtained at a higher temperature is of a brownish yellow hue, but none has ever been reported as being fluorescent.

On examining the above expressed oil the following data were obtained: Specific gravity at 15° C., 0.9055 (normal specific gravity, 0.930–0.940); acid number, 6 (not abnormal); saponification number, 99.7 (normal variation, 187–200).

The oil extracted by means of the ether possessed the same abnormal physical appearance as the expressed oil, and an examination of it gave the following results: Specific gravity at 15° C., 0.9039; acid number, 8.6; saponification number, 104.1.

The iodine number was not taken in either of these oils, because the observed results so overwhelmingly indicated the presence of mineral oil that it was not deemed necessary.

In view of the fact that the mineral oil must have been added to

the expressed ground flaxseed, it was thought that possibly this added, absorbed, and mechanically retained mineral oil would be removed in larger proportions by expression than the natural oil, which was yet probably contained within the oil cells; but a comparison of the above results, obtained from the expressed and the extracted oils, respectively, would indicate that such was not the case. To be sure the extracted oil has a little higher saponification number (104.1) than the expressed oil (99.7), but this variation is not enough to substantiate this theoretical view.

The above specific gravities and the saponification numbers are all abnormal. All these abnormalities point to the presence of a mineral oil, which was shown to be present in the above oils to the extent of 40 per cent., or basing the calculation on the ground flaxseed itself, each 100 pounds of the ground flaxseed examined contained a little over 14 pounds of added mineral oil.

The writer also desires to note here that while the above investigation was made, a sample of ground flaxseed was met with which possibly indicates an embryonic attempt at adulteration, and no one knows what may come of it. The sample contained the requisite amount of oil, which possessed the same fluorescent appearance as those examined above, but the oil proved upon investigation to be different from anything heretofore examined or recorded. It had a specific gravity of 0.921 at 15 C., an acid number of 106, and a saponification number of about 155. An attempt might be made to explain the above abnormal numbers on the ground that the linseed oil oxidizes very rapidly, raising the acid number and lowering the saponification number, when such a favorable opportunity is given as is presented in ground flaxseed; but this will neither explain the fluorescence nor the presence of an undue amount of unsaponifiable matter. The exact basis of this adulteration the writer has thus far been unable to ascertain.

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## RECENT LITERATURE RELATING TO PHARMACY.

### OUTBREAK OF TETANUS IN ST. LOUIS.

In speaking of the recent outbreak of tetanus in St. Louis, due to the injection of diphtheria antitoxin, Dr. A. C. Abbott (*Phila. Med. Jour.*, November 16th), in brief says that the real cause of the fatalities was either one of two conditions, namely: the presence of

the specific microorganism of tetanus in the serum favorable for growth when injected into the system, or that the serum employed contained the toxin or poison produced by the specific bacillus in the system of the horse circulating in the blood from which the antitoxic serum was obtained.

The latter supposition is thought by Dr. Abbott to be the more likely explanation: First, because the conditions under which the antitoxic serum is prepared are not favorable to the growth of the *Bacillus tetani*, even if it were introduced into the serum from some outside source during its preparation. This specific bacillus will not grow in the presence of oxygen, and as the blood when drawn from the horse, as well as the serum during its after-treatment contains oxygen, it is evident that no bacilli of tetanus were growing in the serum, and secondly, because antiseptics such as phenol, formaldehyde and tricresol are used in the preservation of serums. Thirdly, had the serum contained the bacilli or spores of tetanus in large numbers, tetanus would almost certainly have developed in some one or another of the susceptible animals used in standardizing the serum, which did not occur. He goes on to say that this condition may be due to the very small amount of antitoxin mixed with the toxin which is administered to the guinea pig, and a possible remedy in the future being to inject the test-animal with an amount of antitoxin equal to that administered to a human adult.

As for the future development of tetanus in the horse, from which the serum is obtained, little can be said, for we know but little about the real time required for the bacilli to develop in the system to such an extent as to produce diagnostic symptoms.

In this same journal, of November 30th, we find the report of the Commission appointed to investigate these cases of tetanus, during which investigations it was found that the serum of August 24th was obtained from two different animals or from the same animal at two different times; the first being obtained before the attack or period of incubation, and the other or toxic serum after or during the period of incubation. The experiments which were carried out on susceptible animals showed this to be the case, as some of the animals injected with serum marked August 24th showed toxic symptoms, whereas others injected with other samples also marked August 24th did not show any toxic symptoms whatever, seventy

four animals having been used in this investigation. Some of the conclusions arrived at by the Commission might be summed up as follows:

That the disease was tetanus was proven without a doubt by clinical observation on nine patients, there being in no case any wounds or injured epithelial surface on the body except those caused by the entrance of the injecting needle, and these places were without inflammatory reaction. To prove the diagnoses a number of autopsies were made immediately after death and the diseased portions studied carefully both macroscopically and microscopically.

That the toxic serum of August 24th contained no *Bacillus tetani* or its spores.

That the toxic serum of August 24th and serum of September 30th contained the toxin of *Bacillus tetani* previously formed in the horse from which it was prepared. The animal from which this serum of September 30th was obtained was shot on October 3d because it had tetanus.

That the toxic serum of August 24th and that of September 30th were identical in nine different particulars, and that the non-toxic serum of August 24th was different in the same number and kind of tests; the Commission therefore concludes that the serum of September 30th had been issued without previous biological tests, and that some of this same toxic serum had been filled into tubes previously marked August 24th.

That the blame for this awful catastrophe can be laid only at the door of those who had charge of the preparation and testing of this toxic serum.

It will be seen from the review of Dr. Abbott's article, which was published some time before the Commission was appointed to investigate the cause of this catastrophe, that he quite accurately and minutely described a number of details which the Commission after a long investigation found to be the facts. From Dr. Abbott's most able article and its subsequent proving we should draw this one lesson as regards bacteriology: that it is a science based upon strong natural principles and not upon some mere disconnected links of some idle fancy.

The members of the Commission cannot be too highly praised for their careful and incessant efforts to elucidate the matter.

In this connection a note on tetanus as a possible complication in vaccination might be considered. Cases of this nature have arisen quite frequently this Winter in Camden, N. J., "where the complications were more extensive than anywhere else in the history of vaccination." The true cause of these cases of tetanus was not due, as many supposed, to the contamination of the vaccine virus and consequent infection of the wound but to the infection of the wound by the patient from several possible sources, namely: underclothing, uncleanness in general, especially of bandages and surrounding flesh; air, water which may have been used in cleansing the wound, or it may have come from the unclean instruments of the physician, or improper cleansing of the inoculating area.

It must be remembered that the possibilities of infection from vaccine virus are remote in these days of asepsis and antiseptics, also that a case of tetanus in a calf is a rarity.

The preventive measures presenting themselves in this connection might be summed up as follows:

First, that the point of inoculation must be perfectly clean (chemically and bacteriologically).

Second, that the instruments used in making the scarifications must be sterile.

Third, that the inoculated area must be protected by a sterile shield and not a germ-loaded bandage.

W. S. WEAKLEY.

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## EDITORIAL NOTES AND COMMENTS.

### TO MARK DR. CHARLES RICE'S GRAVE.

The editor of the *Pharmaceutical Review* (January) calls attention to the fact that the grave of Dr. Rice is without a suitable tablet to mark it, and suggests that, "under the circumstances, it is the duty of the representatives of American pharmacy to see that the spot where the earthly remains of Dr. Rice rest, be marked at least in a modest way. A granite boulder carried by glacier from a distant state to New York, no one knowing its exact home, would seem a fitting monument to the deceased; a brightly polished surface with his assumed name, by which the pharmaceutical world knows him, with the date of his death, a fitting inscription. Let us honor the man and his memory, but let us do it in a way that would gratify him. The unassuming man who seems ever to have

been ready to give what he had to others, to whom ostentation was repugnant, whose life was a life of work, should have a monument befitting his character.

"A more enduring monument than a granite or marble shaft should be raised, but not at Woodlawn Cemetery. A pharmaceutical research laboratory, such as would have delighted Dr. Rice, the scientist, had he been able to work in it for the past twenty-one years and direct from it the revision of three editions of the United States Pharmacopœia, is the most fitting monument that American pharmacy can erect to his memory. But while such a larger monument is under contemplation, let us not entirely forget the resting place of Dr. Rice and mark the spot in a manner befitting the character and temper of the man."

It should be said in this connection that Dr. Rice so conducted his life that his own personal interests were always subservient to those of his fellows, and there is good reason to believe that he so disposed of his personal effects that they went to those whom he intended they should benefit.

As to courting honors and favors which did not come from the heart, he had too fine an appreciation of truth and goodness ever to desire these. So, whatever we do in honor of this truly great man, let it be done in a spirit of fraternity and reverence. His memory is our inheritance, and I am sure he would not reproach us if we did something to mark his grave (see this JOURNAL, June, 1901, p. 305) providing we did it quietly and unostentatiously. When the plans are developed no doubt all who desire to share in this tribute will be given a chance to do so.

As we have already said: "One ventures to believe that an adequate memorial of him will some day be undertaken."

#### THE GERMAN PHARMACOPŒIA.

H. G. Greenish has given a critical review (*Pharm. Jour.*, Sept., 1901, p. 315) of the descriptions of the vegetable drugs of the German Pharmacopœia, and concludes "that the compilers of the German Pharmacopœia had no pre-arranged systematic plan for dealing with this part of the materia medica. They have admitted the desirability of dealing with powdered drugs, but they have not, in my opinion, dealt with them in a very satisfactory manner. Important toxic as well as non-toxic drugs have been left with insufficient

details of their structure, or indeed without any. . . . The extreme brevity of the macroscopic descriptions is to be regretted, but on the other hand, the introduction of numerous descriptions of the microscopic structure is much to be commended."

#### FERTILIZATION.

In an article on the nature of the "Process of Fertilization" in the *Medical News* (Nov. 16, 1901) W. J. Gies reviews the recent work which has been done by a number of investigators, and in summing up the chief experimental results says:

(1) Extracts of the spermatozoa of the sea-urchin, which have been made by the ordinary methods for the preparation of enzyme solutions, do not possess any power of causing proliferation of the ripe ovum.

(2) No evidence could be furnished of the existence of a zymogen in spermatozoa.

(3) Extracts of fertilized eggs, in the earlier stages of development, were likewise entirely devoid of segmental activity.

(4) Enzyme seems to be excluded from the catalytic substances which Loeb and others have thought may influence the initial divisions of the ovum after the introduction of the spermatozoon, although it is possible that the conditions of these and previous experiments were unfavorable to the manifestation of activity on the part of fecundative ferment. It seems more probable, however, that Loeb's theory of the influence of spermatogenic ions in fertilization affords the true explanation of the phenomena in question.

#### PRUSSIC ACID IN CASSAVA.

According to Carmody (Botanical Dept., Trinidad) there appears to be no grounds for the common belief that sweet cassava contains more HCN the older it is. Nor is there any ground for the belief that the locally grown sweet cassava is but a degenerate growth resulting from many years' association with the better variety. The analyses of the author show that in *sweet cassava* the prussic acid is *not uniformly distributed* throughout the tubes and that in *bitter cassava* it is *uniformly distributed*, or nearly so.

#### THE ATOMIC THEORY.

In the Inaugural Address of A. W. Rücker, the President of the British Association for the Advancement of Science, the atomic



theory was considered in the light of modern discoveries, and instead of concluding that it had served its purpose, Dr. Rücker concludes (*Chem. News*, 1901, 133) "that in spite of the tentative nature of some of our theories, in spite of many outstanding difficulties, the atomic theory verifies so many facts, simplifies so much that is complicated, that we have a right to insist—at all events till an equally intelligible rival hypothesis is produced—that the main structure of our theory is true; that atoms are not merely helps to puzzled mathematicians, but physical realities."

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## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

PHARMACOPEDIA, a commentary on the British Pharmacopœia, 1898. By Edmund White and John Humphrey. With 46 full-page plates. London: Henry Kimpton, 13, Furnival Sq., E. C. 1901.

The authors have recognized a need in all countries, of educators and students alike, to acquire such a knowledge of the subject-matter of the respective Pharmacopœias as may exert an evident possible beneficent influence on the physician and pharmacist in their relation to the cure of the sick and diseased. Educators will admit with Huxley, as quoted by the authors: "The knowledge I have looked for was a real, precise, thorough and practical knowledge of fundamentals; whereas that which the best of the candidates in a large proportion of cases have had to give me was a large, extensive, and inaccurate knowledge of superstructure."

The Pharmacopœias represent the knowledge that has been tried, accepted, and is likely to be valuable for a limited number of years. This knowledge is based on experiment, reasoning, and fundamentals that are necessarily not contained in its pages. These fundamentals are what ought to be sought and acquired by teachers and students as well as practitioners and pharmacists. Works tending to this end are not only to be desired but are valuable in alleviating human suffering and prolonging life. The failure to possess this knowledge is one factor that is delaying the progress in medicine and pharmacy.

The authors in this treatise have wisely confined themselves to the subject-matter of the British Pharmacopœia. They have, furthermore, first ascertained the meaning of the British Pharmaco-

pœia, and have expressed this in a brief commentary which the readers and users of the Pharmacopœia will find useful.

The vegetable and animal drugs, as well as chemicals, are treated under the following headings: A general description as to origin and occurrence of the substance; physical and chemical characters; notes or comments. The various preparations are considered under their respective groups, and a "running" commentary is made of each. One of the values of the work is that it *does not take the place of the British Pharmacopœia but it supplements it* in a manner that is commendable to the authors and will be beneficial to the interests of that Pharmacopœia. Authors of text-books, students, physicians, and pharmacists will find it profitable to have the book.

A MANUAL OF VOLUMETRIC ANALYSIS. Treating on the subjects of Indicators, Test-Papers, Alkalimetry, Acidimetry, Analysis by Oxidation and Reduction, Iodometry, Assay Processes for Drugs with the Titrimetric Estimation of Alkaloids, Estimation of Phenol, Sugar; Tables of Atomic and Molecular Weights. By Virgil Coblentz. Illustrated. Philadelphia: P. Blakiston's Son & Co., 1012 Walnut Street, 1901. Octavo, 180 pages. Price, \$1.25 net.

This manual is an elucidation of the principles underlying and connected with the subjects relating to volumetric analysis. The author is perfectly familiar with the modern theories in physical chemistry and has applied this knowledge in the treatment of the subject of indicators. The disturbing elements in titration, such as dilution, temperature, etc., are carefully considered. The fact that standard solutions require to be re-standardized, and that it is very convenient to prepare these empirical solutions when needed, has led the author to devote a special section to this subject, practical examples being given throughout the text.

The following subjects are treated: I. Definitions, Apparatus, Standard Solutions. II. *Analysis by Saturation*: Indicators, Test-Papers, Preparation of Standard Acid and Alkali Solutions, Alkalimetry, Acidimetry, Direct Percentage Estimations, Empirical Solutions in Titrating, Volumetric Estimations of Alkaloids. III. *Analysis by Oxidation and Reduction*: Estimations with Potassium Permanganate, Direct Methods of Estimation, Indirect Methods of Estimation, Estimations with Potassium Dichromate, Determinations involving Iodine and Sodium Thiosulphate V.S., Estimation

of Free Iodine and Iodometry. IV. *Analysis by Precipitation*: Estimation of Combined Halogens, Halogen Acids and Silver, Decinormal Silver Nitrate V.S., Decinormal Sodium Chlorid V.S., Volhard's or Thiocyanide Method. V. *Estimation of Phenol and Volumetric Estimation of Sugars*: Estimation of Phenol, Decinormal Bromine V.S., Volumetric Estimation of Fermentable Sugars, Pavy's Ammoniacal Cupric Tartrate V.S. VI. In an *appendix* are given tables of atomic weights and of atomic and molecular weight multiples and a list of molecular weights of more important elements.

It will not be saying too much to state that the book is a good treatise on the fundamentals of volumetric analysis, and will be found valuable by those interested in the subject.

AN INTRODUCTION TO CHEMICAL ANALYSIS. For Students of Medicine, Pharmacy, and Dentistry. By Elbert W. Rockwood. Illustrated. Philadelphia: P. Blakiston's Son & Co., 1012 Walnut Street, 1901. Price, Cloth, \$1.50 net.

This work has been written primarily for professional students, and is intended to show the value of chemical analyses and their application in the study of medicine, pharmacy, and dentistry. The author is to be commended for the free use which he makes of the metric system.

The subjects treated are brought under the following heads: I. *Qualitative Analysis*: Metals, Acids, Organic Compounds. II. *Volumetric Analysis*: General Principles, Analysis by Neutralization, Analysis by Oxidation and Reduction, Analysis by Precipitation. III. *Applied Analysis*: The Sanitary Examination of Water, The Selection of Poisons, Analysis by Means of the Blowpipe. IV. The Preparation and Testing of Reagents, Chemical Elements, Symbols and Atomic Weights, The Metric System.

The book contains much valuable information and will be found to be an aid to students, but on account of the large number of books of a similar character, will probably be more largely used by the author's own students than others.

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#### PHARMACEUTICAL MEETING.

The third of the series of pharmaceutical meetings of the Philadelphia College of Pharmacy for 1901-1902 was held on Tuesday,

December 17th. Dr. R. V. Mattison, vice-president of the college, presided.

The first speaker was Joseph L. Lemberger, Lebanon, Pa., who has been Treasurer of the Pennsylvania Pharmaceutical Association for more than 25 years and who read a paper on "The Origin, History and Influence of State Pharmaceutical Associations" (see page 7). At the conclusion of the reading of the paper the chairman said that he thought that all pharmacists who were alive to their interests became members of their respective pharmaceutical associations as soon as they could. Mr. Lemberger further stated that he believed that good legislation could be secured if the many pharmacists in Pennsylvania and other States could be organized and their influence brought to bear upon their legislators. (See Professor Beal's paper in this JOURNAL, 1901, p. 69.)

The next paper was on "The Sugar-coated Pill," by William R. Warner, Jr., and was read in the absence of the author by Charles H. La Wall (see page 32). Mr. Thomas S. Wiegand then followed with a paper on the same subject (see page 33). These papers proved to be of historical interest and were discussed by Messrs. Shinn, Lemberger, Remington, Lowe, Boring, McIntyre, Wiegand, Kraemer and the chairman. The discussion brought out the following facts: That the first sugar-coated pills sold in this country were imported from France and were manufactured by Garnier Lumoreaux & Co. Mr. McIntyre stated that the late William R. Warner was the first to make sugar-coated pills in the United States; that these were made at Mr. Warner's store at Second Street and Girard Avenue. Subsequent to this various firms began their manufacture. Among the earliest of these were Bullock & Crenshaw, Philadelphia; Tilden & Co., of New London, N. Y.; and Henry Thayer & Co., of Cambridgeport, Mass. Professor Remington alluded to the method used by Messrs. Parke, Davis & Co. in imparting a gloss to their pills, which was simply to roll them backward and forward over a table coated with paraffin. Mr. Wiegand said this is in principle similar to that pursued some thirty years ago: some confectioners made a secret of a material composed of wax, paraffin, and oil of almond, which gave no better results than wax alone with a few pieces of best quality of French chalk. It is to be noted, however, that none of these substances will be efficacious unless the sugar coat is sufficiently fine before the attrition with the wax and talcum.

Mr. Boring said that while many of the sugar-coated pills were beautiful in appearance that they were often composed of inferior materials and stated that he had, for instance, cut open pills of proto-iodide of mercury and found them to contain the bin-iodide.

William G. Toplis gave an interesting paper with demonstration on "A Method of Filling Capsules with Essential Oils" (see page 36). The paper was discussed by Messrs. Haussmann, Lowe, Boring and the chairman. Mr. Toplis said, in answer to various questions, that he was of the opinion that the method would work equally well with any of the volatile oils as eucalyptus, sandal-wood, etc.; that he had not worked with creasote and other substances that were mentioned. Dr. Mattison alluded to the peculiar phenomena of the swelling of the starch containing the oil on the addition of cold water, and suggested that some one investigate this subject.

The next paper was on "Ground Flaxseed Adulterated with Mineral Oil," by Lyman F. Kebler (see page 39). The paper was accompanied by a number of interesting specimens. Mr. Beringer called attention to the fact that he had examined some flaxseed some years ago (see this JOURNAL, 1889, page 167), in which the oil had been partially extracted and to which corn meal had been added. Mr. Cliffe stated that grinders of flaxseed found it necessary to remove a part of the oil to facilitate grinding. Dr. Mattison remarked that the adulteration of flaxseed was largely due to the high price consequent on the failure of the crop and that instead of exporting flaxseed we are now importing as many as 1,700,000 bushels.

A paper on "The Pharmacologic Assay of Drugs," by Professor Arthur R. Cushny, of the University of Michigan, was read, in the absence of the author, by Professor Kraemer (see page 1). The paper was discussed by Messrs. Wilbert, England and the chairman.

There were quite a number of attractive and interesting exhibits. A mill manufactured by the Abbe Manufacturing Company was described by Professor Remington. The grinding is accomplished by means of pebbles made of flint obtained from Greenland, they are enclosed in a cylinder, which is slowly rotated. It appears to be useful in grinding such substances as opium, extract of colocynth, cantharides, arsenic and other substances, the grinding of which usually affects the operator on account of the poisonous or irritating properties of the dust formed. Mr. Wilbert stated that he had

found the mill better adapted as a mixer for Dover's powder and the grinding of hard substances, as extracts, than for powdering drugs. Mr. Boring stated that in making Dover's powder, Dr. Squibb's idea was that much of the value of the powder consisted in the thorough trituration of all the ingredients together.

Wm. R. Warner & Co. exhibited a number of well-finished sugar-coated pills. Hance Brothers & White exhibited a line of elastic capsules. Gilpin, Langdon & Co. showed among other products a line of assayed powdered vegetable drugs.

E. H. Gane, New York City, sent over recently a specimen of "chibu," which had been received by Messrs. Kesson & Robbins from one of their customers in Porto Rico. The product is used principally for making balsamic pills and elixirs in Porto Rico, and is reported by the natives to be valuable. According to Mr. Gane it is apparently very similar to our "gum thus," and our syrup of white pine compound will doubtless answer all the purposes of chibu. Richard Shoemaker exhibited a sample of mesquite gum recently sent from Texas. The gum can be furnished at a low price, and might be used for some purposes in place of sorts of gum arabic. John Laval & Sons sent a remarkably fine specimen of Virginia snakeroot.

Mr. William McIntyre presented a check for \$35 for the use of the pharmaceutical meetings, and stated that inasmuch as he was a life-member of the College and was not required to pay any further dues; and, furthermore, that, as he had profited by his attendance at the pharmaceutical meetings, he desired to give to the College an equivalent of annual dues for the past seven years. The check was accepted, and a vote of thanks was tendered Mr. McIntyre for his donation.

Before adjourning it was announced that the following provisional program had been arranged for the next meeting on January 21st:

"The History and Uses of Digestive Ferments in Medicine." By Benjamin Fairchild, New York City.

"Filtration of Drinking Water." By William G. Toplis.

"Solubility of Tablets." By A. M. Hance.

"Seidlitz Powders." By R. H. French.

"Discussion on Modern Drug Store Methods.

Various exhibits and some other papers are also expected.

H. K.

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*FEBRUARY, 1902.*

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## THE EVOLUTION AND USE OF THE ANIMAL DIGESTIVE FERMENTS IN MEDICINE.

BY BENJAMIN T. FAIRCHILD.

"Ever since the time 'ferments and ferment action' have been known," says Oppenheimer in his recent work on the subject, "their investigation has covered the whole field of inquiry in all branches of biology, because where there is life their manifestations play an important rôle. All the problems of animal and vegetable metabolism—in brief life—are in some way related to the province of the ferments."

Sir Michael Foster in his "Lane Lectures," 1901, declares: "The history of physiology can be regarded in no other light than as the heart or kernel of the history of medicine."

In attempting a review of the immense labors elucidating the nature of the ferments of digestion, we find ourselves confronted with a subject which, to present with the fulness it invites, would take us far beyond permissible limits. It is therefore necessary to attempt simply a brief, clear and authentic (in so far as possible) view of the genesis of the subject as it comes to and concerns us to-day in pharmacy and medicine.

Physiology, as a science, was evidently unknown to the ancients; and when the ignorance concerning human anatomy still existing at the beginning of the seventeenth century (Harvey discovered the circulation of the blood in 1628) is taken into consideration, physiology in general, as well as its application to digestion, must, at best, have been in its infancy at this period.

It is therefore remarkable that the Belgian chemist, Von Hel-

mont (1587-1644), should be credited with the statement that not the acids, but a definite body similar to those producing fermentation, was the vital principle of the stomach. Is this a modern construction of some of his writings, or is it one of those brilliant conceptions several centuries in advance of the times? As he termed all processes accompanied by the evolution of gases, even the effervescence of carbonates upon the addition of acids, "fermentation," our faith is somewhat shaken.

That the stomach played an important rôle in the digestion of food was no doubt evident to physicians of all times, but the value of the gastric juice and the existence of the secreting glands was first perceived by Borelli. (1608-1679.)

With the dawn of the scientific era and the application of scientific method in physiological investigations our knowledge of digestion expanded. In 1752 Reaumur published his investigations, carried out on a regurgitating buzzard or kite, and established the fact that digestion is independent of the mechanical power of the stomach; that a chemical change is produced in the food by the juices of the stomach, and that these latter have no action on vegetable food.

In 1772 Hunter noted the fact of post-mortem digestion, in which the stomach itself is digested and dissolved by its own juice. In 1777 we find Stevens applying Reaumur's method to a regurgitating man, but eliciting nothing new.

Then followed the classical researches of Spallanzani (1783), who by ingenious devices obtained from the living animal (birds and beasts) gastric juice quite free from extraneous matter. He was the first to clearly define the marked difference between peptic digestion and the phenomena of fermentation and putrefaction, and succeeded in demonstrating the potency of gastric juice outside of the body—in vitro. Inspired by Spallanzani's observations, Senebier, a surgeon of Geneva (Saint Evangele), suggested and employed gastric juice in surgery in the treatment of foul wounds, sores and cancers, etc., and his results being communicated to Jurine of Geneva, and Toggia of Turin, they (the former especially) made extended experiments in the application of gastric juice obtained from various animals—bullocks and sheep. They all observed that the gastric juice had the power "to remove all disagreeable smell from fœtid ulcers; to give them a clean appearance; to change the quantity and qual-



ity of the suppurated matter, and to obtain a speedy cicatrization." Carminati, a celebrated professor of medicine and surgery at Pavia, to whose notice these investigations were brought by Spallanzani, likewise used the gastric juice of animals as topical applications, and also used it internally in cases of indigestion, etc., with equally good results—the first recorded therapeutic use of a digestive secretion.

It is probably due to the absorbing interest manifested for the multitude of discoveries in all branches of science, more particularly in chemistry (by Scheele, Lavoisier, Gay Lussac, Berzelius and others), at the close of the eighteenth and the early part of the nineteenth century; probably also to the disturbed social and political conditions incidental to the Napoleonic wars, that the researches of Spallanzani did not become generally known. Then, again, the difficulty of the subject, the crudeness of existing methods, the want of exact instruments and appliances, may account for the conflicting opinions and theories, for the cessation of marked progress in the physiology of digestion, up to 1831. It was about this time (1828) that a discovery of the utmost importance in chemistry, the breaking down of the barrier between organic and inorganic chemistry, the destruction of the idea of the existence of a "life" force peculiar to organic bodies, viz., the synthesis of urea, was made by Wohler. This may well be conceived to have given a fresh impulse and promise to the isolation of some of the principles concerned in vital action, and thus to the study of the physiology of digestion, for the most important advances follow close on this time.

In 1824 by Prout—and independently by Thiedemann and Gmelin in 1826—free hydrochloric acid was found in gastric juice, and believed by the latter to be the digestive principle.

Luechs discovered, in 1831, the power of saliva to dissolve starch and convert it into reducing sugar; later Schwann, Mialhe and Cohnheim corroborated the statement and precipitated the active principle by various methods.

In 1834, the publication of the results of Beaumont's observations of natural digestion in the human stomach—in a case of a traumatic fistula—terminated the discussion regarding the existence, activity and acidity of gastric juice. Beaumont, however, advanced the theory of the combination of the juice with the food to form

“gastrites,” and assumed the gastric juice to be the only digesting fluid of the body—an illustration of unfounded deductions leading to great error in association with important truths.

In the same year Eberle materially advanced our knowledge of digestion by successfully preparing active artificial gastric juice by scraping the mucus from the inner wall of the dead stomach and extracting the same with water and with dilute acids. He demonstrated that hydrochloric acid alone would not digest proteids and produce chymification. He however fell into the error of assuming that mucus itself was the active principle.

Eberle prepared similar infusions of other glands, particularly the pancreas, and was the first to note that it “liquefied gelatine, changed starch into sugar, and emulsified fat”—observations for which he does not seem to receive due credit.

Eberle apparently made no attempt to separate the ferment; but his method for preparing unlimited amounts of artificial gastric juice removed a great obstacle in the path of progress (scarcity of gastric juice, as well as contamination with other secretions, chyme, etc.) and paved the way for Schwann’s brilliant researches in 1836. Apparently at the instigation of Johannes Müller, Schwann repeated Eberle’s experiments, and this in so thorough and careful a manner that almost all of his observations and results hold true to-day. He found that the active principle was soluble in water and feeble hydrochloric and acetic acids; that acid was essential for its manifestations; that free acid alone had no solvent power on coagulated albumen; that the active principle was not in combination with acids; that an excess of acid destroys; that dilution does not weaken the activity if the acidity is maintained; that the action is a “contact action.” He believed the ferment to be gradually destroyed during its action; that there is marked similarity between digestion and fermentation; but noted that no oxygen was consumed and no carbonic acid liberated during digestion; that the same causes arrest or destroy both, as heat, strong alcohol; that digestion requires acid, fermentation, oxygen; that in both, small quantities produce great changes. He tested the active principle in its behavior with acids, with metallic salts, with tannin; showed how it differentiated from albumen by not being precipitated with ferrocyanide of potash; from caseine by its failure to precipitate with ferrocyanide and acetic acid; and that it differs from “salivin” and

"ozmazome"—names given then to other forms of proteids. He attempted to ascertain its nature, whether simple or complex; noted the curdling action on the casein of milk and proved that this was not due to the acid; likewise studied its proteolytic power on muscular tissue and fibrin. Further showed that it was not mucin or a constituent of mucus, but secreted by the glands of the mucous membrane. He did not isolate the pure ferment (it has not been accomplished yet), but developed a method of purification by precipitation with mercury chloride and lead acetate, the metal being subsequently precipitated by hydrogen sulphide and removed by filtration. He was the first to ascribe a ferment nature to the active principle of the gastric juice, to which he gave the name pepsin.

In 1839 Wasmann—a pupil of Müller and Schwann—following the method of the latter, prepared a dry amorphous product by precipitating the filtrate, after removal of the metal, with alcohol, and drying the precipitate at low temperature.

Wasmann obtained a very potent product in this way from the pig stomach, extracting with water at 35–40° C.

He is stated by Frerich as having considered the active principle a combination of pepsin and hydrochloric acid.

The younger Burdach published, in 1841, the results of various experiments tending to show that acidulated infusions of many organs and tissues possess proteolytic powers. A glance at his results shows that this power was exceedingly weak.

In 1842, Blondlot in France, Bassow in Russia, succeeded in establishing gastric fistulæ in dogs; later on extended to the pancreas by Bernard, Heidenhain, etc. Blondlot in his treatise speaks of the nature of chyme, and in a rambling, incoherent manner of various fermentations, etc.

Lehmann, in 1842, treats of the manner of the proteolytic action of pepsin, considers it a protein of cellular origin and capable of transforming ingested albuminoids into substances susceptible of absorption. He credits Wasmann with regarding the granular matter in the glandular cells—the "cystoblastima" of Schwann—as either pepsin itself or the substance from which pepsin is formed.

In 1845 Bouchardat and Sandras published results obtained with the pancreatic juice of fowls, exhibiting great diastasic power. They subsequently continued their investigations on rabbits.

These authors are given credit for being the first to discover the

saccharifying power of the pancreas, although in 1833 Eberle found his artificial pancreatic juice to convert starch into sugar. Frerich gives the credit to Professor Valentin, of Bern, although Gamgee in his history now objects to this.

Bernard, in 1845, states that the whole function of the pancreas is its power to emulsify fat; this function was first noted by Eberle.

Frerich, in 1846, reviews the whole subject of digestive ferments, stating that the pancreatic juice changes starch to sugar, decomposes bile into insoluble substances for excretion, and, with the assistance of the bile, emulsifies fats. He argues in favor of an analogy between digestion and fermentation, combating the pepsin-hydrochloric acid and "contact" theories; assails Bernard for assuming that all of the various phenomena of digestion are produced by one and the same ferment, insisting upon the existence of independent ferments possessing specific powers, grouping them as digestive ferments.

In 1849 Bernard reports success in establishing pancreatic fistulæ in dogs, thereby opening up the field for accurate investigations of this gland. He failed to note its proteolytic function.

Bidder and Schmidt, in 1852, contribute a paper on the digestive fluids of dogs and cats, giving an analysis of gastric and pancreatic juices. With the latter they fail to obtain proteolytic action on coagulated egg albumen, but obtain marked action on starch. Their remarks on pepsin contain nothing noteworthy.

Although there is some dispute whether Eberle or Purkinji and Pappenheim should be given the priority of discovering the proteolytic power of the pancreas, Corvisart, in 1857, removed all doubt concerning the existence of the proteolytic power by careful systematic investigation. He pointed out that the activity of the juice varied with the time elapsed since feeding, and believed the failure of others to note this function of the gland due to killing the animal at the most unfavorable period of digestion, the most active being between the sixth and ninth hour after a full meal.

In 1858 Dr. Lionel Beale published a method of preparing pepsin by scraping the mucous membrane of the stomach and drying the viscid fluid so obtained on glass at a low temperature. He and Corvisart appear the first to suggest the use of "pepsin" in medicine.

Meissner, in 1859 and 1860, made an exhaustive study of both

peptic and pancreatic digestion, more particularly with a view to ascertaining the nature of the digestive products formed. Miahle was the first, according to Meissner, to use the term "albuminose" in reference to the products of proteid digestion, but the term as Miahle used it included all these products. Lehman, according to the same authority, proposed the term "peptone," and recognized different kinds of peptones, and described their character.

Meissner corroborated the results of Lehman, and discovered other intermediary products between albumen and peptone, experimenting on both raw and coagulated albumen, meat, etc.

Meissner likewise proved the correctness of Corvisart's results concerning the proteolytic power of the pancreas; but, strange to say, found it inert in aqueous and alkaline media and active only in acid medium.

He did not believe pepsin alone to be of any promise of therapeutic value, assuming it worthless unless acid was given at the same time. He therefore advocated the administration of peptone prepared outside the body with hydrochloric acid and pepsin, preferably from meat, as that from egg albumen was too bitter—the whole made more palatable by salt, spices, etc.—and gives a formula for preparing this peptone. He likewise suggested the use of the peptone solution as a nutritive enema.

Brucke, in 1859, published a very complicated method for preparing pepsin, said by him to yield a product quite free from adhering proteid matter. It is of scientific interest only, and probably seldom or never used now.

An interesting paper appeared in 1862, by Danilewsky, a pupil of Kuehne, on the active principles of natural and artificial pancreatic juice. It is written in a clear and definite manner, and seems to bring order into the confusion of views on the subject current at that time. His conclusions are that there are three distinct ferments present, acting respectively on starch, fibrin and fat; that two of these ferments can be isolated in a form of comparative purity, the fat-splitting ferment being probable; that the amylolytic ferment acts in acid, (?) alkaline and neutral media, the proteolytic in neutral and alkaline only; that the digestion of the coagulated fibrin is not due to putrefaction; that alkaline media is not favorable, excess of free alkali or free hydrochloric acid checking the action of fibrin. Further, that the proteolytic substance is not a pure albuminoid, but is a colloid substance.

Krassilnikow, a student of Brucke, first made use of dialysis in purifying pepsin in 1864.

Hoppe-Seyler, in 1864, published a comprehensive table, classifying the various forms of proteids, characterized by their solubility and by their precipitability with various neutral alkaline salts, as sodium chloride, magnesium sulphate, etc.

One of the earlier contributions on the pancreas, its ferments, the nature of its action on proteids, the cleavage products formed, etc., a subject that was made the special study of Kuehne and his pupils, appeared in 1867. Since then, up to 1880, numberless papers on the subject have appeared, and our present knowledge of this subject we owe largely to this investigator. Kuehne also gave the name trypsin to the proteolytic ferment, and introduced the term "enzymes" to designate this class of active principles, viz., the digestive ferments.

Von Wittich, in 1869, suggested the use of glycerin in extracting the pepsin, and this has since been employed extensively both in scientific research as well as in the manufacture of the digestive ferments and their preparations.

Scheffer, in 1872, published a method for preparing commercial pepsin by precipitation from an acid infusion of the stomach with common salt. He also stated that other neutral alkali salts, such as sodium sulphate and magnesium sulphate, could be used instead of common salt with good results. The action of saturated solutions of some of the neutral salts of the alkalies on different protein substances induced him to try their effect on pepsin.

In 1873 we find Ebstein and Grutzner demonstrating that pepsin does not exist as such in the stomach, but is rapidly formed from its progenitor—termed pepsinogen by these authors—by the gastric acid. Schwann and Wasmann seemed aware of this fact, but laid no stress on it. Langley, more recently, and Glaessner, during the past year, have given this subject careful study. Heidenhain discovered a zymogen, now called trypsinogen, in the pancreas in 1875.

Enabled by the great improvement in technic and by the introduction of antiseptic methods, Heidenhain, Klemensiewicz and Thiry during the seventies, Pawlow and his pupils during the nineties, observed the functions of the digestive glands under various conditions and influences in the living animal. Interesting and

instructive as these investigations are, we cannot dwell upon them here.

In 1883 Kuehne and Chittenden employed and advocated the use of ammonium sulphate as a superior precipitant of the albumoses, in separating these from true peptone.

Recent scientific inquiry seems directed chiefly to attempts to isolate the pure enzymes in the hope of ascertaining their chemical nature; careful examination of the cleavage products of proteids, produced by enzyme or by chemical action, to throw some light upon the structure of the proteids themselves. Schoumow, Simanowski (1894), Wroblewski (1895 and 1898), Pekelharing (1896), Friedenthal (1900) and Nencki and Sieber (1901) published investigations on the chemical nature of enzymes in support of their proteid nature.

Chittenden in connection with his various pupils, Osborne and Campbell, Hopkins, Kossel, Kutscher, Siegfried and others, have since Kuehne's time wrestled with the difficult problem of isolating and characterizing the multitude of forms of proteids, native and derived, but as yet the synthesis of albumen has not been accomplished.

Chittenden, chief among contemporaneous investigators in physiological chemistry, has made extended and varied experiments and researches, and has contributed voluminously to the literature on the subject. His experiments, in fact, are quite too numerous for reference. We cite these as especially pertinent: "Human saliva," "A comparison of natural and artificial gastric digestion," "Influence of peptones and certain inorganic salts on the diastasic action of saliva," "The relative formation of proteoses and peptone in gastric digestion."

It is also to be said that the studies of the illustrious Kuehne are likewise so voluminous that no adequately detailed mention of them can be made.

New methods of assaying the various preparations of digestive enzymes have been suggested by Kremel, Mett, Allen, etc.

The influence, deleterious and beneficial, of condiments, spices, beverages, antiseptics and medicinal agents upon the functions of digestive enzymes, received the attention of Chittenden, Stutzer, Buchner, Fraser, Mann, Mabery, Goldsmith, Roberts and others.

König, Bomer, Kjeldahl, Stutzer, Wiley, Mallett, developed

methods for ascertaining the composition and food value of the products of enzyme action, viz., the various albumoses and peptones of the market.

From the very first, we observe speculations upon the nature of the changes produced by digestion. Von Helmont believed it to be a fermentation; Eberle, chemical solution; Schwann, contact action differing from true fermentation; Frerich again speaks of it as fermentation; then Pasteur proved that fermentation was due to micro-organisms, and a distinction was made between organized and unorganized ferments, Kuehne suggesting the name enzyme for the latter.

Since Buchner's undoubted discovery in 1897 that alcoholic fermentation of sugar is produced by an enzyme—Zymase—which can be isolated from the yeast cell, the old theory that fermentations could only be produced by living cells, being inseparably associated with the life of these cells, has been shattered; and the thought that all true fermentations are caused by enzymes, and that the digestive processes, among others, should be classed as such is rapidly gaining credence.

The Zymase has not received complete chemical analysis, not having been prepared in sufficiently pure form. It appears to be very closely related to proteids.

Loew has described the enzymes as being very labile proteid substances, containing both aldehyde and amide groups. Oppenheimer denies that the enzymes themselves are labile, but capable of producing cleavage in other labile molecules, they themselves remaining unaltered.

The products of the digestion of food have naturally been the subject of scientific investigation related to the study of the ferments themselves, and to our subject; for the reason that foods increasingly enter into therapeutics both in the prevention and in the cure of disease. The main point of view from which it must be regarded in medicine is the physiological—that the prime function of digestion is the conversion of food of all classes into a soluble, assimilable and nutritive form.

The obstacles which we have encountered in the chemical investigation of the enzymes in a measure exist in relation to various proteids, native and derived, owing to their colloidal, non-volatile and readily decomposable nature. However, it is sufficient to state



that we have arrived in recent years at definite methods for the precipitation and separation of certain proteids, albumen, albumoses, peptones, etc., and the nitrogenous crystallizable, associated and derived principles of the food.

In the study of the derivatives of starch digestion similar difficulties are encountered in the separation of certain of the soluble carbohydrates, namely, the dextrins, but their color reactions are so marked as to afford reliable and well-known methods for distinguishing them. The crystalline nature of the sugars, the maltose and dextrose, has made their chemical constitution well known.

So we have authoritative methods for the analysis of food and food preparations. It is within the power of the analyst to distinguish between a preparation that is merely a stimulant and one that is, in the strictest sense, a complete nutritive; he is in a position to judge the degree of the change produced in the foods by digestion, and to form an opinion as to the relative assimilability of foods.

The coagulated albumen may, in its susceptibility to ferment action, be compared to gelatinized starch; the acid-albumen or syntonin, to soluble starch; propeptones, to erythro-dextrin; deuteroproteose, to achroo-dextrin; peptone, to maltose, and the more resistant antialbumen or dyspeptone, to cellulose.

The methods by which chemists distinguish these various soluble products in their various stages of solubility belong to the chemical side of the subject; their chief physiological significance is simply that as the digestion proceeds the substances become more soluble, more highly diffusible. Furthermore, chemical analysis as applied to these organic substances necessarily involves methods which, perfect for the chemist to distinguish their reactions and behavior, in themselves bring into play agencies never encountered in physiological conditions.

The influence of various and single food elements—sugars, albumen, gelatines, albumoses, peptones, etc.—have long been the object of study in the feeding of animals. These various substances have also been artificially introduced into the circulation and the effects observed.

When we come to trace the results of scientific research and experiment in the chemistry of digestion as taking practical form in pharmacy and medicine, we have to go back but a brief time,

especially if we restrict ourselves to that period when it can be said that the facts adduced concerning the nature and behavior and relations of the enzymes receive anything like general recognition, and their practical utility realized and applied.

Pepsin was first officially recognized in pharmacy by the French Codex of 1866, as pepsin medicinale, by the method originally suggested by Schwann and elaborated by Wasmann—the precipitation by lead acetate and evaporation of the purified solution of the pepsin, and incorporation with starch. Pepsin by this method first appeared in commerce from French sources.

In 1867 pepsin appears in the British Pharmacopœia, by the method originally suggested by Beale.

The first mention of any preparation of pepsin in the German Pharmacopœia is in 1872—"wine of pepsin" prepared from the stomach. The first preparation of pepsin appearing in the United States Pharmacopœia is pepsinum saccharatum, 1880; also the liquor pepsinæ, prepared from the saccharated pepsin. It was not until the Pharmacopœia of 1890, that an official standard was adopted for "pepsin," and the strength of saccharated pepsin prepared with this being increased six times over that of 1880. The U.S.P. defines no method of manufacture of pepsin. The special interest and significance of the pharmacopœial requirements of pepsin are in providing a commensurate standard of activity and practically complete solubility.

It is interesting here to note the digestive strength of these various official preparations of pepsin—the French forty times its weight of moist fibrin with lactic acid; the British one hundred times its weight; the U.S.P. pepsin three thousand, and the saccharated three hundred times its own weight of coagulated albumen. As for the pepsin of commerce, Boudault's is stated to convert four times its weight; Scheffer's saccharated digesting from ten to fifteen times its weight of coagulated egg-albumen in from five to six hours.

Scheffer's process and Scheffer's pepsin may justly be characterized as marking an epoch in the production of pepsin by a method admirably adapted for commerce. It had the great merit of employing reagents innocent in themselves and strongly antiseptic, and this is especially advantageous from the fact that the precipitate or magma which is collected is so strongly impregnated with the salt that either in the moist or pressed form it retains its properties under

the ordinary conditions of manufacture, without decomposition, until reduced to dryness.

It is to be noted in this connection that the sodium chloride and the other salts suggested by Scheffer threw out of solution a very large proportion of the soluble proteid bodies formed in the maceration of the stomach, or the stomach membrane, in the diluted hydrochloric acid at ordinary temperatures; the viscid solution thus formed containing the proteids very largely in the form of albumose, this giving an exceedingly copious, light, flocculent precipitate, which has the advantageous property of rising to the surface and of carrying the ferment embedded, so to speak, with the proteids in which it is associated.

By re-solution, clarification and re-precipitation, the product obtained could be purified to a considerable degree from the precipitant and associated proteids and salts of the gastric infusion, and a pepsin thus of great activity resulted. This Scheffer's "purified pepsin," however, did not come into general use in medicine, and was especially offered as a means of preparing saccharated.

Scheffer himself, although, as he remarked, confining himself specifically to the production of a pepsin, leaving its virtue to be established by physicians, nevertheless expressed the opinion that the "purified" (undiluted) pepsin might produce undesirable results. He considered the milk sugar desirable, therefore, in addition to its specific utility, as a means of reducing the pepsin to a pulverulent form, overcoming the obstacle inherent in the extremely tough and insoluble nature of the precipitated pepsin when reduced to dryness without some suitable absorbent.

Saccharated pepsin by the Scheffer process soon became very generally manufactured in commerce, but its very advantages, the facilities with which the raw material could be treated and the product obtained, may account for the appearance in commerce of pepsin which obviously could not have been produced by any means in accordance with Scheffer's methods, namely, the clarification of the acidulated solution, assay of the precipitated pepsin and incorporation of the diluent milk sugar to a definite standard of digestion test. Much saccharated pepsin of commerce was greatly deficient and feeble in action, so much so as to be of trifling value.

About ten years subsequent to the introduction of Scheffer's process there appeared a method, patented by Jensen, based upon the

fact long before recognized, as we have seen, that the stomach was capable of self-digestion, and thus the tissue of the whole stomach or the mucous membrane converted into a soluble form. This product when dried, therefore, contained the ferment in association with the peptones produced by its action. It is at this time unnecessary to state that the products of peptic action—the peptonized proteids—possess no digestive action (although at one time there appeared to be some impression of this current) and their hygroscopic nature distinctly unfits them as a vehicle or basis for commercial pepsin if associated in any large degree with the ferment.

It may be said that all pepsins are produced by processes embodying principles which have been developed by scientific research and experiment; at present, in brief, the infusion of the stomach by such methods as to obtain the ferment in solution as free as possible from associated proteids, or else by heat to convert the paptic glands into complete solution, and the precipitation of the enzyme from this solution by such well-known reagents as sodium chloride, sodium sulphate, magnesium sulphate, etc., and purification by various methods—dialysis, etc.

In these processes, advantage is taken of the fact that by infusion of the gland with heat, in acidulated solution, the whole tissue can not only be converted into solution, but carried forward to such a point as to yield a considerable proportion of peptone, this not being precipitable by the reagents mentioned; so that by this means the pepsin as precipitated is at the outset of a much higher activity than that associated, as already described, with a large amount of albumoses.

During this time no progress in the utilization of the pancreas ferments at all comparable to that in pepsin had been made, very evidently for the reason that scientific observations concerning the varied nature and action of the pancreas enzymes had either escaped attention or failed of appreciation. "Pancreatine" seems to have been made by methods almost identical with the "salt process" for pepsin, ignoring the fact that the pancreatic ferments are soluble in salt even in concentrated solutions—not precipitable by salt. Scheffer criticized this method, for he proved sodium chloride incapable of precipitating pancreatin.

In spite of the fact, then, that the pancreatic ferments had been shown to possess great energy in the conversion of starch and of

albuminoids, practical attention had been chiefly directed to the pancreas function of digesting fat, and even in this respect the pancreatine being defectively prepared (and saccharated) its value was practically negative.

Pancreatine was first officially recognized in the U.S.P. in 1890, and about this time the National Formulary recognized it with a method for its manufacture and adopted the U.S.P. standard as to its proteolytic power, especially relating to its practical use in the peptonization of milk.

"Pancreatine," as officially recognized by the U.S.P., is defined as a mixture of the enzymes of the pancreas gland, digesting albuminoids and converting starch into sugar.

Pavy, in 1867, suggested the first preparation of an artificially digested food, obtained from meat and preserved in a fluid form.

Roberts, in his Lumleian Lectures of 1880, demonstrated the adaptability and potency of the pancreas ferments for the peptonization of foods for the sick, especially the susceptibility of milk as well as farinaceous foods to artificial pancreatic digestion. He adduced numerous experiments as to the behavior of these ferments of practical significance, and suggested methods for preparing pharmaceutical preparations of them, discussing and illuminating the whole subject in this series of brilliant and practical lectures. It was he, it appears, who brought into use the word "peptonized" as a convenient term for the description of artificially digested foods.

The pancreatic ferments had been previously utilized in a very primitive and extemporaneous manner; for instance, treating meat by direct incorporation with the fresh gland, especially for nutritive enemata; "pancreatized" fats, in a similar manner, and pancreatic emulsions were also introduced into pharmacy, resulting from the treatment of fat by direct maceration with the fresh gland pulp.

*(To be continued.)*

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## FILTRATION OF DRINKING WATER.

BY WILLIAM G. TOPLIS.

The need of water purification begins immediately after its delivery by the mighty distillery of Nature.

Its contamination is commonly incident with its delivery, while its purification often follows closely by the operation of natural

laws; yet the great mass remains a source of the utmost solicitude so far as the health of communities is concerned. The impurities in water may be separated into two principal divisions, namely, Inorganic and Organic. That consisting of mineral substances, such as salts of K, Na, Ca, Ba, Mg, as may be dissolved by the water in its passage through the earth, is of the first class, and from a hygienic point of view is not of a particularly harmful character, though from a technical point of view it presents considerations of most serious importance.

In the second class is embraced every substance produced during the life-processes of plants and animals. It is to this source of contamination that our attention is most earnestly directed for the purpose of providing a wholesome and economical water-supply. To this kind of contamination is chargeable all of the diseases peculiar to drinking water. It must be plainly understood that disease is not necessarily due to the simple presence of organic matter, but such material invariably decays, and it is this change that causes the trouble by enabling pathogenic organisms to prolong their existence.

From the beginning of time Nature has rid herself of all dead organized bodies in but one way, decay, brought about by the growth of bacteria at the expense of the dead matter. These minute vegetable organisms, either by their mechanical presence or through their excretory products, are responsible for all water-borne diseases.

With such facts in mind, then, it is but natural that effort is being constantly put forth to remove from our water-supplies not only the bacteria, but the pabulum for their existence—the organic matter.

Nature has pointed unerringly the way. Springs have long been held in popular esteem as the source of pure drinking water, and not without good reason, for in the majority of cases springs sustain this reputation after chemical and biological examination. It has long been known that impure water percolated through a deep bed of sand issues greatly improved in chemical character, but the precise nature of the changes were not thoroughly understood until Koch's revelation made possible the isolation and study of individual species of bacteria. Art seeks to copy the changes so long carried out in springs, but with the precise care of scientific exactness instead of the haphazard of chance, as in

springs. The sand filter, therefore, means the most exacting, painstaking care to establish the proper conditions, together with the wise application of much chemical, bacteriological, and engineering knowledge. The container is commonly built of concrete, though masonry and puddled clay embankments are not infrequently used. The bottom of the container is carefully graded so that drainage will be equal from every part. The underdrains are given like careful attention for the same reason, and are built of broken stone or large gravel measuring 2 to 3 inches on 3 diameters. It is spread in a layer 6 to 8 inches deep; on top of this is spread several inches of smaller gravel then finer, until we have a bed 12 to 16 inches in thickness. Upon this is placed 4 feet of fine sand, exercising care to pack it evenly, and avoiding holes and ways. The chemical character of the sand and gravel must be carefully looked into, as it is important to avoid carbonates and sulphates of the second group. Much carbonic acid is formed during the operation of the filter, and this in solution has the property of dissolving carbonates of calcium magnesium, barium, strontium, creating increased temporary hardness, while any sulphate of calcium would materially add to the permanent hardness. The best material for the purpose is a sharp silicious sand. Having constructed the filter it is filled by introducing water at the bottom to avoid disarranging sand by escaping air. The filtration is at once begun, and bacteriological and chemical samples of water are regularly collected from the effluent and likewise from the applied water. At first there is but little difference in the character of the water, either bacteriologically or chemically. After a few days a comparison of the bacteriological counts on the raw water with those of the effluent will show a very marked increase of bacteria in the effluent over that of the applied water; this increase will steadily rise until after a variable period of time, usually two weeks, the counts rapidly diminish until they become less than one per cent. of the number in the applied water. At the same time a comparison of the chemical analyses of the effluent and applied water will show in the effluent greatly decreased free and albuminoid ammonia, practically no nitrites, and greatly increased nitrates. The operation during this period of time is known as the ripening of the filter. It embraces many complex changes of absorbing interest, and copies with scientific exactness the example which

nature carries out in springs under the most favorable conditions. For convenience of illustration, we may assume that the bulk of organic matter is embraced within the elements C, H, O, N. No matter how complex the molecules may be, the matter is ultimately broken down into the most simple compounds of the elements, namely, C into  $\text{CO}_2$ ; H and O into water, and the N into nitric acid or salts of the same. This is all brought about through the functioning of those minute vegetable cells called bacteria, not instantly, but progressively; not necessarily all in one operation, but in consecutive changes, proceeding orderly and with deliberation until that which was organic and perhaps toxic becomes the most simple inorganic compounds of the elements, quite harmless and ready food for plant assimilation. This is all carried out in a slow sand filter, and the object is to cultivate rather than destroy bacteria. The sand is not the filter, the sand is simply the bones upon which the filter grows. Surrounding each individual bacterium, under the microscope may be seen a gelatinous envelope, when many bacteria are joined together in mass; this envelope may be seen collectively without a lens, forming a jelly-like mass and is then called a Zoogloea. In a sand filter this Zoogloea attaches to and covers completely each grain of sand in the filter. The grains form fine avenues through which the water is compelled to pass. The bacteria line these avenues. The water carrying its organic content brings it as food for the bacteria in the Zoogloea. As the water passes along, it is gradually relieved of its organic matter, because it is digested by the bacteria, and in its place bears away the products of the decomposition. Sublime in its beautiful simplicity! We have chemical and biological proof of each change. Those just mentioned are indicators of every step—C into  $\text{CO}_2$ ; H and O into water, N into nitric acid and its compounds; but the proper conditions must be maintained, and perhaps the most important factor, aside from the bacteria, in the operation of the filter, is oxygen. Without this element the particular kinds of bacteria necessary for water-purification cannot perform their function. The oxygen must be in solution and carried along with the water into the filter, where it is utilized in the oxidation changes.

Winogradsky has shown that nitrifying or oxidizing bacteria grow upon media altogether inorganic. No less than three separate and distinct classes of organisms are concerned in the transition of nitrogenous organic matter to the inorganic state, as follows:



It is broken down into ammonia—as the first change by one class of organisms, and here becomes truly inorganic. The second step is one of oxidation, and the ammonia becomes nitrous acid through the agency of another entirely separate organism quite different from the first. In the third and final step, the oxidation is completed by another organism entirely distinct from the other two. Here the nitrous acid becomes nitric acid, which unites with any base at hand, and is delivered as such in the effluent. This is why our filter, working under favorable conditions, shows neither free nor albuminoid ammonia, but does return the equivalent in nitrates that an ammonia determination on the raw water would call for. As before stated, the proper conditions must be preserved, and one of these is the element of time; how rapidly may we pass the water through the sand as an economical proposition? As might be predicted, the character of these changes would require a slow rate of flow; therefore, filtration must be restrained or controlled and maintained at a uniform rate, notwithstanding a constantly diminishing filtering capacity due to clogging. This is accomplished in several ways by automatic devices. It is not safe to carry the filtering rate much beyond 3,000,000 gallons per acre per twenty-four hours. This has been found by actual working conditions to be the safe limit, so far as bacteriological and chemical conditions are concerned. A 3,000,000-gallon rate is equivalent to filtering 10 vertical feet of water over the entire area of filter in twenty-four hours. The problems met with in water purification seem to change with each source of supply, and so variable are they that no municipality would undertake the erection of a filtration plant without exhaustive study of the conditions covering practically a whole year. In some waters, color is the objection; in others, taste is complained of, while turbidity and sewage, with every imaginable combination of all the faults, is commonly found.

The principal problem encountered by the city of Philadelphia in its effort to purify the water is that of turbidity. True, we have sewage contamination, odors, tastes, etc., but they readily disappear under treatment. The turbidity, however, gives trouble, particularly at times of freshet, when the suspended matter may rise to 200 or 300 parts per million. This requires frequent scraping of the filter, resulting in loss of water and cost for attention. Under ordinary working conditions, with water carrying less than 40 parts per

million, the filter should not require scraping more than thirteen to fifteen times per year, but in times of freshet I have seen the experimental filters shut down and scraped once a week. This condition is exceptional, however. After scraping, the bacterial counts are high, so the water is run to waste for a period. My observation on this point was that forty-eight hours usually elapsed before the counts returned to the normal. The depth of water covering the filter is about four feet; this head forces the water through the sand. As the deposits accumulate there is diminished flow, gradually decreasing until the pressure is insufficient to deliver the 3,000,000-gallon rate, then the filter is shut down, drained and scraped.

The operation of scraping the filter consists of removing about  $\frac{1}{2}$  inch in depth of sand from the surface, together with the deposit of mud, etc., after which the surface is raked even and filtration proceeds as before. At the end of a year the total amount of scrapings is washed, loss made up, and returned to the filter in one operation.

In order to be sure that there are neither holes nor ways through the filter, an ingenious procedure is adopted as follows: Large quantities of a culture of *Bacillus Prodigiosus* are applied to the surface of the filter at regular intervals of half an hour each for a period of twenty-four hours. Millions of these organisms are introduced at each application. Test samples of the effluent are taken every fifteen minutes during the time of the trial. Plates are made of each sample and counted. The *Bacillus Prodigiosus* grows best upon agar-agar producing a bright red colony distinguished at a glance from the ordinary water bacteria. If there are any ways or openings in the filter the bacilli are sure to be found in the effluent. When the test was applied to this city's experimental filters we found but two plates showing red colonies out of several hundred trials, and it is just possible that these were accidental contaminations, proving conclusively the excellent construction of those beds.

In order to have the results of all bacteriological investigations comparable, it is absolutely necessary that the methods of manipulations be uniform. One most important stride in this direction was made by Fuller when he demonstrated that the medium most suitable for cultivation of bacteria for water work is that composed of gelatin 10 per cent., peptone 1 per cent., salt  $\frac{1}{2}$  per cent., dissolved in meat infusion representing the soluble portion of 500 grammes of

lean beef to a litre of water, the finished product having an acidity of 15 degrees. This means that a litre of such medium would require the addition of 15 c.c. of normal sodium hydrate solution to bring it to the phenolphthalein neutral point. It has been repeatedly demonstrated that this medium gives larger counts than the same material made more acid or more alkaline, showing the very marked influence that the degree of acidity exerts upon the development of the bacteria under examination. This medium is the one now used almost universally by water analysts.

The special apparatus used in quantitative bacteriological investigation is quite simple, consisting essentially of test-tubes and petri dishes. The petri dish is simply a circular glass vessel about four inches in diameter, with raised edge from three-eighths to one-half inch high. Two of these make a complete dish, the upper one fitting loosely over the lower. There are other pieces of apparatus, but those named are most in evidence.

Absolute sterility of media and apparatus is the only condition under which this work can be successfully carried out. To make a plate, the sterilized glass dish is set upon the level table; a tube of the gelatin medium, previously described, containing about 7 c.c., is fused by gentle heat, and when cooled to about blood temperature, a measured quantity of the water to be examined is introduced from a sterilized graduated pipette. The test-tube is shaken to thoroughly incorporate the water with the medium, which is then poured into the petri dish and immediately covered. After it has solidified it is placed in the incubator, where it remains for a period of forty-eight hours at a uniform temperature of 20° C., being the most favorable temperature for the cultivation of water bacteria. This period of incubation is adopted, because it not only indicates the condition as well as a longer time would do, but gives a more speedy notification of any change in the filters. Counting is done with the aid of a simple lens, and refers not to the number of bacteria on the plate, but to the number of colonies. Each colony is supposed to be the progeny of one original bacterium, and the count gives the relative number of bacteria in the water at the time of plating. Determination of species is unnecessary as a routine procedure, though frequent search is made for the *Bacillus Coli Communis*, as this organism is invariably present in sewage and serves as an indicator of its presence in the water-supply.

Chemical considerations require so much time for their description that I shall simply be content with naming over such processes as have been found most satisfactory at the Testing Station, Philadelphia. For this information I am indebted to Dr. George E. Thomas, the chemist in charge of this branch of the work.

For Color, Hazen's Platinum Cobalt Standard, described by Leffman.

For Turbidity, Whipple and Jackson, Mt. Prospect Laboratory, Brooklyn.

For Solids, 100 c.c., evaporate to dryness, with loss on ignition.

Suspended matter, collected on filter of asbestos, operating with a litre of water.

The two ammonias collect six tubes from each distillate for Nesslerization. The peculiar clouding of the distillate noticed at times on addition of Nessler Solution may be corrected by addition of mercuric chloride to Nessler Solution.

Nitrites.—Alpha naphthylamine hydrochloride and sulphanilic acid.

Nitrates.—Reduction by aluminum foil and direct Nesslerization of the ammonia.

Oxygen Consumed.—Potassium permanganate and oxalic acid.

1 c.c. potassium permanganate sol. = .0001 gm. O.

Chlorine.—Titrate with nitrate silver, potassium bichromate as indicator; using yellow light gives sharper indication of end reaction.

Alkalinity.—Hehner's method, using  $\frac{N}{50}$   $H_2SO_4$ , described by Leffman.

Total hardness.—Soap method.

Oxygen dissolved.—Winkler's method in Sutton.

$CO_2$ .—Seyler's method —  $\frac{N}{50}$   $Na_2CO_3$ , using phenolphthalein as an indicator, described in a recent issue of the *Journal of the American Chemical Society*.

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## SEIDLITZ POWDERS.

BY ROLLAND H. FRENCH.

This paper is to be regarded as the result of an effort on the part of the writer to simplify the seemingly complicated and impracticable methods which have been set forth by previous investigators of the

subject, and, if possible, present a method of analysis which it would be practicable for the average pharmacist to carry out.

The most able effort on the subject which has come to the writer's notice is a paper by Joseph Huntington, which was published in the *AMERICAN JOURNAL OF PHARMACY*, 1900, p. 461, and reprinted in a number of other pharmaceutical journals.

In this the U.S.P. method of titration with potassium hydrate volumetric solution was used for tartaric acid. An indistinct end reaction is here encountered, unless carried out in hot solution, on account of a precipitate of potassium bitartrate.

The method for the estimation of the Seidlitz mixture consists in first estimating the sodium bicarbonate by adding an excess of sulphuric acid volumetric solution and titrating back with potassium hydrate volumetric solution. Second, another portion of the Seidlitz mixture is ignited, taken up with water, and titrated as in the previous case. The amount of solution required for the sodium bicarbonate alone is then subtracted, the remainder representing the Rochelle salt.

This method gave 31.44 per cent. sodium bicarbonate and 85.86 per cent. Rochelle salt, making a total of 117.3 per cent.

The 17.3 per cent., which this runs high, was accounted for from the fact that the work had been done in a warm room, which had caused a loss of moisture. No experiments were made, however, to prove the latter theory.

As can be seen, the working of this method is not at all satisfactory, and the inaccuracy of the final result does not justify the effort required.

The experiments which the writer has carried out on the subject will here be described and the conclusions reached noted.

A series of experiments were carried out with chemically pure salts to ascertain the possibilities and to afford a means of comparison for the work on the samples to follow.

Sodium hydrate volumetric solution was used for the titration of the tartaric acid, the precipitation thus being avoided, and perfectly satisfactory results being obtained in the cold.

Experiments were then made with the ingredients of Seidlitz mixture to ascertain the effect of exposure under various conditions. Quantities of Rochelle salt and sodium bicarbonate, corresponding to the weights given by the U.S.P. for one powder, also

a portion of Seidlitz mixture, all made from the C.P. salts, were exposed under ordinary conditions, that is, in a room ranging from  $18^{\circ}$  to  $22^{\circ}$  C., and their weight taken every two or three days during the course of four weeks. They were then placed in a room decidedly warmer than the average, ranging from  $28^{\circ}$  to  $33^{\circ}$  C., and the weights taken as in the former case. In both cases it was found that the condition of the weather had a good deal to do with the weights.

The characteristic results obtained by these experiments are best shown by a table, as follows :

Substance Taken and Weight in Grammes.	TEMPERATURE $18^{\circ}$ TO $22^{\circ}$ C.			TEMPERATURE $28^{\circ}$ TO $33^{\circ}$ C.		
	Weather and Date.	Loss in Grammes.	Per Cent. of Loss.	Weather and Date.	Loss in Grammes.	Per Cent. of Loss.
	Nov. 3, 1900, Started Experiment.			1901.		
Rochelle salt, 8.000.	Nov. 27th wet.	'002	'025	Jan. 3d wet.	'009	'112
	Dec. 9th dry.	'007	'087	" 10th dry.	'0115	'143
	" 15th wet.	'000	—	" 12th wet.	'008	'100
Sodium Bicarbonate, 2.600	Nov. 27th wet.	'004	'15	Jan. 3d wet.	'004	'15
	Dec. 9th dry.	'009	'34	" 10th dry.	'012	'46
	" 15th wet.	'0025	'09	" 12th wet.	'005	'19
Seidlitz Mixture, 10.333	Nov. 3d wet.	'065	'63	Jan. 3d wet.	'104	1'006
	Dec. 9th dry.	'099	'95	" 10th dry.	'145	1'403
	" 15th wet.	'092	'89	" 12th wet.	'127	1'229

Rochelle salt contains 25.52 per cent. water of crystallization. To determine the loss sustained by heating to various temperatures a portion was heated in an air bath :

At  $100^{\circ}$  the loss was 23.43 per cent.

At  $130^{\circ}$ – $135^{\circ}$  the loss was 24.19 per cent.

Above  $135^{\circ}$  decomposition commenced, showing it to be impossible to separate the last trace of water without decomposition.

Following these experiments, investigation was made upon six samples, all of which were collected without discrimination from reputable houses.

All were subjected to the qualitative tests of the U.S.P., after

which the quantitative work was taken up; the white powders or the tartaric acid were first examined, followed by the blue or the Seidlitz mixture.

*Quantitative Tests.*—The volumetric solutions used for these tests were :

Sodium hydrate, of which 1 c.c. =  $\left\{ \begin{array}{l} .05633 \text{ grammes NaOH} \\ .01055 \quad \quad \quad \text{H}_2\text{C}_4\text{H}_4\text{O}_6 \end{array} \right.$

Sulphuric acid, of which 1 c.c. =  $\left\{ \begin{array}{l} .009327 \text{ grammes H}_2\text{SO}_4 \\ .004184 \quad \quad \quad \text{CO}_2 \\ .2684 \quad \quad \quad \text{KNaC}_4\text{H}_4\text{O}_6 \end{array} \right.$

The tartaric acid was titrated with sodium hydrate volumetric solution, phenolphthalein as indicator, as mentioned in experiments, the calculation being made in the regular way.

*The Seidlitz Mixture* was analyzed by first estimating the sodium bicarbonate by a carbon-dioxide determination, then the Rochelle salt by ignition and titration.

This method will be best understood by carrying through an example, thus :

If 1.722 grammes of Seidlitz mixture be placed in a carbon-dioxide apparatus and a slight excess of hydrochloric acid used for decomposition, it will yield 0.225 grammes of carbon-dioxide gas. The amount of sodium bicarbonate is then calculated from this weight of  $\text{CO}_2$  as follows :

$(\text{CO}_2 \text{ 43.85}) : (\text{NaHCO}_3 \text{ 83.85}) :: .225 : .42985$  grammes of  $\text{NaHCO}_3$ ,  
then,

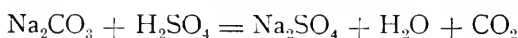
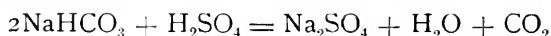
$1.722 : .42985 :: 100 : 24.96$  per cent. of  $\text{NaHCO}_3$ .

For the Rochelle salt estimation another portion of 1.722 grammes is taken and ignited carefully in a small crucible to entire carbonization. This ignited mass is then taken up with water, all of the washings being carefully collected. This solution now contains the carbonates from the Rochelle salt, also that from the sodium bicarbonate. This solution is titrated directly with the sulphuric acid volumetric solution, using methyl orange as indicator. The solution of carbonates required 74.75 c.c. of the sulphuric acid solution.

From this must be deducted the number of c.c. required for the carbonate from the sodium bicarbonate in order to determine the

exact amount required by the Rochelle salt. This may be calculated directly from the  $\text{CO}_2$  in the previous determination, but it must be remembered that one-half of the  $\text{CO}_2$  from the bicarbonate has been driven off during its conversion into bicarbonate by ignition. Therefore, one-half of the  $\text{CO}_2$  yielded by the bicarbonate must be used for determining the sulphuric acid required for the carbonate yielded from it.

This is shown by the following reactions :



The calculation would be thus :

$$(\frac{1}{2} \cdot 225) \div .004184 = 26.8 \text{ c.c. H}_2\text{SO}_4 \text{ V.S.}$$

Then 74.75 c.c. required for the entire carbonates less 26.8 c.c. required for the carbonate from the bicarbonate, leaves 47.95 c.c. required for the Rochelle salt.

The Rochelle salt is then ascertained thus :

$$47.95 \times .2684 = 1.28697 \text{ grammes Rochelle salt found.}$$

Then,

$$1.722 : 1.28697 :: 100 : 74.731 \text{ per cent. Rochelle salt.}$$

The six samples were all examined and analyzed by the methods just described, with the results shown in the following table. The U.S.P. weights and theoretical per cent. are also given to enable comparison :

SEIDLITZ MIXTURE.

No.	Weights in Grammes.	Results of Qualitative Tests.	Per Cent. Sodium Bicarbonate.	Per Cent. Rochelle Salt.
1	10.676	Trace of sulphates.	24.962	74.731
2	10.323	Traces of iron.	30.731	68.818
3	10.948	Traces of sulphates and chlorides.	29.622	66.792
4	10.043	Traces of calcium and sulphates.	23.963	75.838
5	10.384	Traces of chlorides.	25.073	71.702
6	10.279	Traces of calcium and chlorides.	25.296	74.196
U.S.P.	10.333		25.000	75.000



TARTARIC ACID.

No.	Weight in Grammes.	Qualitative Tests.	Estimation.
1	2.102	Traces of lead and sulphates.	99.66
2	2.308	Sulphates and traces of calcium.	100.07
3	2.679	Sulphates.	99.18
4	2.673	Sulphates, traces of lead and calcium.	100.05
5	2.253	Traces of lead and sulphates.	99.98
6	2.308	Sulphate and trace of lead.	100.04
U.S.P.	2.250		

*Comments.*—The tartaric acid, as is seen by the table, is almost uniformly of good quality.

The weights of the Seidlitz mixture show quite a little carelessness in weighing or measuring, and the results of analysis show that there is also considerable carelessness in making up Seidlitz mixture. Numbers 3 and 4 especially show this. It will be noticed, by adding up the percentages in numbers 3 and 5, that they are quite a little low. These samples both showed tests for chlorides, which were, however, found to amount to but a small fraction of a per cent. It was noticed that these samples were particularly caked, indicating that the low percentage might possibly be due to adhering moisture.

They, together with a portion of C.P. Seidlitz mixture, were then dried at 100° with the following results:

C.P. sample, loss = 18.805 per cent.  
No. 3. " " = 20.048 "  
No. 5. " " = 21.735 "

It is observed that the loss in number 3 is 1.243 per cent. more than the C.P., and in number 5 is 2.93 per cent. more. This does not quite account for the entire shortage, but it is enough to show that it is in all probability the cause.

To verify this conclusion a portion of C.P. Seidlitz mixture was triturated in a mortar with a quantity of water equivalent to the shortage in per cent., and to all appearances it remained a dry powder, caking when wrapped up and laid away.

Upon examination of the work and results just set forth it will be seen that for all practical purposes the Rochelle salt might be obtained by difference between the entire weight taken and the

sodium bicarbonate found. Therefore, for all commercial purposes, a Seidlitz-powder analysis consists in making a  $\text{CO}_2$  determination, calculating the sodium bicarbonate therefrom, and (providing the qualitative test shows no contaminating impurities) determining the Rochelle salt by difference.

Before concluding, it might be well to state that designs for carbon-dioxide apparatus are to be found in nearly all reliable text-books, and many of them can be simply and quickly constructed.

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## SOLUBILITY OF COMPRESSED TABLETS.

BY ANTHONY M. HANCE.

Among the useful forms of medicine adopted in recent years there is none of greater importance and value than compressed tablets. Like all innovations in medicine, their adoption was somewhat slow. The physicians' requirements could very readily be supplied by pills, either gelatin- or sugar-coated, of which a large variety of combinations then existed.

The tablet form of medicine possesses important advantages not to be secured otherwise, such as minimum of bulk, certain and more rapid solubility and quicker therapeutic action. Certain combinations which readily undergo chemical change in the presence of moisture can be made into tablets to better advantage than into pills. Certain conditions may be successfully treated with medicine in tablet form, when pills would be impracticable, as, for example, where a continuous local effect is desired.

The purpose of this paper is to call special attention to the one all-important and absolutely indispensable quality of all scientifically compressed tablets, namely, solubility. Upon this one quality alone the tablet, as a form of medicine, stands or falls.

A tablet may be made ever so accurately and conscientiously with respect to purity of materials, skill in manipulation, a faultless check-system to guard against errors, uniformity in weight and size and handsome appearance; but, if the one quality of solubility is wanting, it is not a good tablet.

In the early days of tablet manufacture, the importance of solubility was under-estimated. The distinct advance was thought to be in the compression of the drug, thus presenting the medicament independent of the usual substances required to make a pill mass. The essential quality was permanence of form.

It seemed sufficient to compress the drug with such firmness that the finished product would not crumble from age nor break from attrition in handling or transportation. This was a mistaken idea. Such tablets were improperly made, and no more certain to produce the desired therapeutic effects than improperly made mass pills.

The distinct advance of compressed tablets over other forms of medicine lies in the fact that they present the drug in permanent and accurate subdivision and soluble form, and the up-to-date tablet is nothing if it does not possess the quality of ready solubility.

Firmness, or that degree of hardness which gives form and permanency to tablets, is essential in all well-made tablets, but neither prevents nor assures solubility.

A tablet which may be readily crushed with the fingers may or may not possess the proper degree of solubility, while it is generally not firm enough to be especially serviceable.

The term solubility as applied to tablets indicates power to disintegrate rather than power to form solutions. It refers to the tablet mass solely, the medicament of which is frequently one or more insoluble drugs, as, for example, calomel, charcoal, etc.

A tablet is soluble when, in the presence of the proper medium, it promptly disintegrates, thus liberating in a minutely subdivided condition the medicament it bears.

The degree of solubility is easily influenced by the nature of the component part. Thus solid extracts, resinous substances and certain drugs, such as reduced iron or corrosive sublimate, make tablets which disintegrate more slowly than others containing dissimilar substances. Tablets of corrosive sublimate are rendered more freely soluble than they would otherwise be by the addition of substances which favor solution, as, for example, muriate of ammonia.

In certain tablets solubility is relative, and quite unavoidably so. In others it is intentionally of slow degree. Throat tablets, in which by slow disintegration a continued local effect is sought, are familiar examples of the latter. In tablets for making extemporaneous solutions, and in hypodermic tablets especially, rapid disintegration and solution are desirable.

The determination of this solubility is a matter of considerable importance. The process is, apparently, quite simple. Drop a properly made tablet into a quantity of water and note the result. Immediately the form of the tablet changes and disintegration rapidly follows.

When this action occurs in the stomach the medicament is in the best possible form for speedy solution and absorption.

The tablets arranged before you for your careful and intelligent inspection, you will observe, possess this quality of free solubility or disintegration, and yet are remarkably firm or hard.

To obtain the results here displayed, it has been necessary to study the characteristics of each tablet batch separately, as well as its intended use and form—as, for instance, an ordinary tablet for the same purpose as a pill, a tablet triturate, a hypodermic tablet—and by repeated experiments determine the special method of manufacture which yields the best results. There is no one rule which can be applied to all tablets with uniformly good results. As each combination has distinct individuality arising from the nature of its component parts, so each kind of tablet requires its own special treatment to yield the most desirable degree of solubility.

A general treatment applies only in the manufacture of such simple and compound tablets as chlorate of potash, soda-mint, muriate of ammonium, and the class designated "throat tablets," in which quick solubility is neither sought nor desired.

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## PROGRESS IN PHARMACY.

A REVIEW OF SOME ADVANCES MADE DURING THE PAST YEAR.

BY M. I. WILBERT.

After reading an interesting book, it is sometimes well to allow the subject-matter to pass in review before our mind's eye so as to impress the more interesting and important points on our memory in a connected and methodical way.

The happenings of a day, a week, or a year are like the records of a book, and if at the close of any specified period we allow the memory of these happenings to pass again through our mind, we will not only be the gainer, by having them impressed more vividly and indelibly on our memories, but we may, in addition, assort the various facts into groups or classes, so as to facilitate our retaining them for future use and reference.

The opening year of the twentieth century has passed into history, and has left us, as a heritage, a wealth of theories and facts that have been discovered and gathered together by the assiduous toil of many earnest workers in the various fields of scientific research.

It is our purpose, in this short paper, to bring before you some of the happenings of this past year that are especially interesting to us as pharmacists. It would, of course, be futile for us to attempt to review even a single branch of research thoroughly, so we will content ourselves by looking about and picking out for review just a few of the more prominent and interesting facts in two subjects or classes that we as pharmacists are, or should be, particularly interested in. These are, in the first place, the bibliography of pharmacy, especially the pharmacopœias and their accompanying books or commentaries, and then just a passing glance at some of the new drugs, or new uses for old drugs. In attempting so wide a field we will be compelled to ignore almost entirely the great amount of valuable information that has appeared during the year in the pharmaceutical journals, and can only mention briefly the lines that have been more thoroughly cultivated by the various contributors.

Numerous papers have appeared on the subject of standardizing drugs and preparations, and many ingenious methods have been brought forward to simplify the necessary processes, and to increase the accuracy of the ultimate results. In this connection we should like to call particular attention to a paper by Linde (*Apothkr. Zeitg.*, 1901), in which, under the able direction of Professor Beckurts, the author gives a summary of the methods of extraction, and the menstrua or solvents proposed by various authorities for assay processes. The review includes processes for sixteen specific drugs, and numerous reviews of general methods. Seventy-eight separate papers by sixty-five different authors are included in this review.

The use of the microscope has been the theme of many interesting papers. The value of this instrument in recognizing drugs or their adulterations is now generally recognized, especially in Germany, where the national pharmacopœia includes many more or less accurate descriptions of drugs in the powdered state. It is from Germany too that we would naturally expect the greatest advances along this line. During the year two very important books on this subject have come from the German press: "Die Mikroskopische Analyse der Drogenpulver," by Prof. Dr. L. Koch, and a second edition of "Schimpers Anleitung zur Untersuchung der Vegetabilischen Nahrungs und Genussmittel."

Adulterations have of course been the constant care of a host of watchdogs in the pharmaceutical profession, and the reports from

these able and disinterested workers have called attention to many crude as well as refined methods of contaminating drugs and food-stuffs with inert and sometimes dangerous materials. One of the most abominable and despicable methods of adulterating or cheapening galenical preparations is by the substitution of methyl alcohol in some of the preparations generally sold for domestic consumption. We will have more to say on this subject later under the title of Methyl Alcohol.

Pharmacopœias, representing as they do the sum total of progress or research available to the respective revision committees, or commissions, are always objects of considerable interest to the scientific pharmacist; and especially is this true of us at the present time, for we are all more or less interested in the revision and improvement of our own United States Pharmacopœia, and the scientific or practical success or failure of other pharmacopœias may indicate subject-matter to adopt or avoid in our own.

Among the pharmacopœias more directly interesting to us is that of the other half of the English-speaking world, the British Pharmacopœia. The field of usefulness for this work has been extended by the republication and elaboration of the Indian and Colonial Addendum. This may be considered as the forerunner of the proposed British Empire Pharmacopœia. This addendum includes 122 titles: fifty-three of vegetable origin; two animal (*Hirudo Australis* and *Mylabris*); one chemical (*Pyrogallol*), and sixty-five galenical preparations. Articles designed for a particular colony, and differing from the same class or kind of article official in the body of the pharmacopœia, are only to be used in the colony or zone for which they have been designed, and are not to be used or dispensed in any other portion of the empire unless especially ordered.

To avoid misunderstandings, the empire has been divided into seven districts or zones: (1) India, (2) African Colonies, (3) Australian Colonies, (4) Eastern Colonies, (5) Mediterranean Colonies, (6) North American Colonies, (7) West Indian Colonies.

"The Pharmacopœia," by Edmund White and John Humphreys, is a commentary on the British Pharmacopœia. This book has been ably reviewed in the January (1902) number of the *AMERICAN JOURNAL OF PHARMACY*, and deserves more than a passing notice. Pharmacopœias of all lands are apt to be rather above the capacity and abilities of the average pharmacist, and it is for commentaries

of just this kind that there is a need and a want—a book that will aid and explain the obscure and knotty problems of the standard of authority. Works of this kind tend to bring the pharmacist up to the level of the Pharmacopœia, instead of doing as some supposed commentaries do, bring the Pharmacopœia down to the level of the average and even mediocre dealer in drugs and patent medicines.

The Germans have for years had commentaries along the lines followed by the Pharmacopœia. We need but refer to the well-known work by Hirsch, in which he was assisted in the later edition by Dr. Alfred Schneider. The fourth edition of this popular book is now in press, being published under the able direction of Drs. A. Schneider and P. Süss as a commentary to the fourth edition of the "German Pharmacopœia." Another German commentary that is being issued at the present time is that of Jehn and Crato. Both of these works, however, are rather comprehensive. For such of the members of the German pharmaceutical profession as do not feel able to subscribe to these more or less pretentious and expensive works, and still wish to have something more available for reference than the very able and thorough aids and criticisms published in the German pharmaceutical journals, they have the choice of "Chemische Reagentien und Reactionen des Deutschen Arzneibuches IV," by Holdermann and Kendle, or the popular "Anleitung zur Erkennung und Prüfung aller im Arzneibuch für das Deutsche Reich (4te Auflage) Aufgenommenen Arzneimittel," by Dr. Max Biechle.

The fourth edition of the German Pharmacopœia has been most thoroughly discussed and criticized, not only in the commentaries and the current pharmaceutical literature, but also in the publications of the large drug houses and manufacturers in their so-called "Handelsberichte" many of the discrepancies of the pharmacopœia have been commented on, and much valuable information been contributed in this way.

The requirements of the German Pharmacopœia are of such a nature that many German apothecaries have found it advisable to attend short post-graduate courses in practical work with the microscope and chemical burette. These courses, it appears, are held in large university towns, and cover about twelve working days. The work with the microscope is largely devoted to the consideration of

the use of the "micrometer ocular" for measuring starch and aleurone grains. The series of chemical tests usually include assay processes for ipecac, cinchona, hydrastis and nux vomica, and also the determination of the saponification and iodine numbers of fixed or fatty oils.

The *Deutschen Apotheker-Verein* published during the year its "Homeopathic Pharmacopœia." This book was published by the society with a view of securing greater uniformity in homeopathic preparations. It has not been officially recognized by the Imperial Government nor any of the smaller states outside of Prussia and Wurtemberg. Dr. William Schwabe has also published a new edition of his "Homeopathic Pharmacopœia." As might be expected, there is considerable difference of opinion between the followers of Schwabe and the Society of Apothecaries as to which book is the more reliable and trustworthy interpreter of homeopathic principles.

The eighth edition of the "Swedish Pharmacopœia" (Svenska Farmakopen) has recently come from the press. This is the first revision of this book since 1879, and, as may be expected, the book presents many marked changes. Following the example set by other leading works of this kind, the text of the book is in the vernacular, while the titles of the various articles are in Latin. The work appears to be thoroughly up to date, and includes among other innovations qualitative and quantitative chemical tests for digitalis, cinchona, opium, belladonna, hyoscyamus, lobelia, ipecac, and nux vomica. The essential or volatile oils have had considerable attention, and a variety of tests are given for possible adulterations. For the fatty oils the saponification and iodine numbers are given. The drugs of animal origin are restricted to wax, lard, spermaceti, and suet. An innovation for this pharmacopœia is the introduction of fluid extracts.

At the end of the work appear various appendices, including lists of the reagents mentioned in the text, maximum doses of potent remedies, atomic weights ( $O = 16$ ) and two indexes. One of these tables deserves particular attention: it is a maximum dose-list of active drugs for domestic animals; it includes thirty-five titles of drugs and preparations and the maximum doses for horses, cattle, sheep, swine and dogs.

The "Swiss Pharmacopœia" is undergoing a revision, and the revision committee, consisting of eleven members, five apothecaries,



one pharmacologist, four physicians and the President of the Federal Sanitary Bureau at Bern, has published for consideration and debate two lists of drugs and preparations that are proposed as additions or changes in the forthcoming work. The two lists comprise a total of eighty-three titles; among others, a general title or proposition for serums. This particular proposition is rather interesting. The committee proposes the adoption of serums under the following headings:

- (1) Tuberculin, Koch.
- (2) Serums, general and special.
- (3) Antidiphtheritic serum.
- (4) Antitetanic serum.
- (5) Antistreptococcic serum.
- (6) Vaccine virus.

In this connection it is proposed to have an official system of tests and standardizing under control of the Swiss Gesundheitsamt. Of the remaining eighty-three titles, twenty-nine are of proposed new additions, among them twenty-one chemicals, four plant drugs, and four galenical preparations. Among the chemical titles are bromoform, ethyl chloride, ethyl morphine hydrochlorate and sodium theobromine salicylate.

Another interesting work in this connection is the "Universal Pharmacopœia," by Dr. Bruno Hirsh. This interesting book consists of a conglomerate of twenty-eight different authoritative works or pharmacopœias. The first volume of the second edition of this work has been issued, and the second volume is said to be ready for press. This is probably one of the most interesting and valuable books in pharmaceutical literature, and it is to be regretted that it is not more readily available for reference and comparative study.

New remedies of a patented or proprietary nature are increasing at a rate that makes it practically impossible to keep in touch with the nomenclature, to say nothing of becoming familiar with the composition or uses of the articles themselves. One apparently good feature of this over-supply is the gradual awakening of members of the medical profession to the fact that many of these supposed wonderful discoveries are nothing more than commercial ventures. No less an authority than Professor Kobert, of Rostock (*Aertz. Vereins blatt f. Deutschl.*), calls attention to the ever-increasing number and varied claims of these compounds, and inquires as to

where the practitioner should look for authoritative information. He admits that the medical journals are too apt to be swayed by their advertising pages, and that at best, reports and opinions of individual workers are of little value; and further, that few if any medical men have the courage to report their failures with new remedies. This latter fact has indeed been most unfortunate, as it has been the cause of untold disappointment and loss, not alone to the suffering patients, but also to the doctor, who, having been induced to try a certain highly recommended compound, fails absolutely to get the desired results, and concludes that either the man who was guilty of writing the glowing account of successful use was mistaken, or that he was pecuniarily interested. And while it takes a number of such experiences to make or have the proper effect, it is just a matter of time when the medical profession will awake to the necessity of having more than the say so of one or even half a dozen professional advertisers before they give aid to and prescribe a drug they know little or nothing about. In this respect the medical literature of the past year shows commendable progress over that immediately preceding. There are a number of reports of unsuccessful use of drugs, or the appearance of unlooked-for and disagreeable secondary actions of the drugs or chemicals employed.

*Adrenalin.*—The active principle of the suprarenal gland has played an important part in the medical and pharmaceutical literature of the year. Its chemistry and uses are well described by its discoverer in a recent number of the AMERICAN JOURNAL OF PHARMACY.

*Agurin.*—A double acetate of soda and theobromine is being brought forward as a substitute for and an improvement on diuretin. It is said to be free from the rather serious objection to the latter compound of causing more or less severe gastro-intestinal irritation.

*Bromocoll.*—A combination of bromine, water and gelatine, said to be dibromine-tannin-gelatin, is claimed to have all the sedative properties of potassium bromide without any of its disagreeable secondary effects. Mayr (*Deutsch. Med. Wochschr.*, 1901) reports using this drug in cases of epilepsy, with favorable results. Dose, 2 to 8 grammes daily.

*Cacodylic Acid.*—The salts of this compound of arsenic are not increasing in popularity. Several fatal cases of poisoning have been

reported, and even French physicians admit that they do not always obtain favorable results. The alleged freedom from ill effects is due (*Apothkr. Zeitg.*, 1901) to the fact that the drug is largely eliminated with the fecal matter, without having been decomposed or changed in any way.

*Chloretone* is another of the new drugs that has not come up to the expectations of the average physician; not being soluble in water, it has not always met with success as a local anæsthetic. *Hedonal* has been reported on from various quarters; several authors object to the peculiar and disagreeable taste of the drug. Secondary effects are said to be not uncommon, but not serious; one of the more disagreeable is due to the fact that the substance is also a diuretic. This action is at times so pronounced that it interferes with continued sleep.

*Hetol*.—Sodium cinnamate. Kuhn (*Münch. Med. Wochschr.*, 1901) considers that the improvement in cases of tuberculosis treated with intravenous injections of this drug was so slight that they may easily be accounted for by improvement in hygiene and surroundings. Gidion (*Deutsch. Arch. f. Klin. Med.*, 1901) comes to the same conclusion, and even reports several cases that have lost weight under treatment.

*Honthin*.—Frieser (*Therapist*, 1901) describes this compound as a combination of tannin with albumin and keratin. He has used it in thirty-two cases with favorable results and believes it to be half as powerful again as tannalbin. It is given in doses of from 0.5 to 1.0 three or four times a day.

*Ichthyoform* is a combination of ichthyol with formaldehyde. Average dose 1.0 to 2.0, used in diarrhœa due to intestinal tuberculosis, also used with good effect in the diarrhœa of typhoid fever. It is said to combine the analgesic and astringent action of ichthyol and the exceedingly energetic influence of formic aldehyde.

*Igazol*, supposedly a mixture containing formaldehyde and iodoform, has been reported on unfavorably by Wolff (*Deut. Med. Wochschr.*, 1901).

*Purgatin*, the diacetate of anthrapurpurin, is one of the most interesting possibilities in the field of synthetic chemistry. It is probably the first compound that promises to be a more or less efficient aperient or cathartic. It was at first marketed under the name purgatol, and is an orange-yellow crystalline powder, insol-

uble in water or dilute acids, but decomposed by dilute alkaline solutions (producing a solution of dark violet-red color). It probably passes the stomach unchanged, decomposing only in the intestinal canal. In doses of 0.5 it is said to produce a mild evacuation of the bowel in from twelve to eighteen hours without griping. It is said to have the same debilitating effect on the intestines that has been noted with other cathartics, especially rhubarb. One peculiar feature connected with this new drug is the fact that it imparts to the urine a blood-red color. The patient should be made acquainted with this fact so as to avoid unnecessary alarm. Stadelman (*Deutsch. Aerzte Zeitg.*, 1901) says that the dose advised by the manufacturers is too low, and that 2.00 is nearer a normal dose.

*Silver*.—Organic salts of this metal threaten to increase indefinitely, despite the fact that they have been repeatedly proven to be more or less inert and ineffective. So far, no satisfactory and reliable substitute for nitrate of silver has been offered.

*Uresin*.—The double citrate of lithium and urotropin is being suggested as a diuretic and urinary antiseptic. It should not be mistaken for the older, though not popular urosin, a combination of lithium and quinic acid.

*Urol*.—A chinate or quinate of urea is being brought forward as a remedy for uric acid diathesis. Dose from 2.0 to 4.0 grammes.

*Urotropin*, *cystogen* and *formin*, under which names various firms are marketing hexamethylene tetramine, have been the subject of considerable comment and discussion. It would appear from the published reports that this compound is not as harmless or as reliable as the earlier reports would indicate. Brown (*Brit. Med. Jour.*, 1901) reports two cases of hematuria after use of urotropin in doses of 0.6 three times a day. Many other reports of a similar nature have since appeared, and it will be well to exercise considerable caution so as to prevent any possible abuse of this remedy by self-medication.

*Apomorphine*.—Douglas (*Wiener Med. Presse*) recommends this drug as an efficient and safe hypnotic. Hypodermatic injections of 0.002 are said to produce sleep within five minutes. It is said to have the advantage of not producing a drug habit, as in larger or repeated doses it produces nausea and vomiting.

*Caffeine*.—Ferraby (*La Semaine Medicale*, 1901) recommends this

drug in cases of poisoning by carbolic acid. He has given 0.15 hypodermatically with immediate favorable results.

*Calcium iodate* has been recommended as a substitute for iodoform. Mackie (*Merck's Archives*) considers it to be an excellent antiseptic, preventing hypergranulation and the formation of pus. It can also be used in solution for washing out the bladder, vagina and uterus. It may also be used in gargles and mouth-washes, or may be given internally to check fermentative processes in the stomach. Dose, 0.2 to 0.3.

*Carbolic Acid*.—The use of alcohol instead of water to liquefy this chemical, gives a solution that mixes readily with fixed oils without separating or producing a turbid mixture. It is also more permanent, not crystallizing in cold weather.

*Formaldehyde*.—The increased use of this compound has increased the possible danger of poisoning from accidental or other causes. *Therapeutische Monatshefte*, 1901, recommends the use of liquid ammonia well diluted, aromatic spirits of ammonia, or even liquid ammon. acetate, the theory being the reduction of the formaldehyde to hexamethylene tetramine, a comparatively harmless substance.

*Horse-Chestnuts*.—Schurmeyer (*Therap. Monatsh.*, 1901) recommends a fluid extract of horse-chestnuts as an external application in cases of rheumatism, neuralgia and painful affections of the skin; also as a gargle in 1 and 2 per cent. solutions. The author also claims that the saponin contained in the horse-chestnut is not poisonous.

*Hydrocyanic acid gas* has been recommended as a disinfecting agent and germicide. It has been in use as an insecticide, especially in greenhouses; also in sleeping cars, to rid them of vermin.

*Ipecac root* has been the subject of much investigation and discussion. It appears that the total alkaloids of Brazil and Carthagenia ipecac are about the same, but their composition varies considerably, the Brazilian root being richer in emetin, while cephaelin predominates in the Carthagenia variety. Both these compounds are emetics, with the consensus of opinion in favor of cephaelin as being the more active. In this connection it may be interesting to note that the Carthagenia root is excluded from the German Pharmacopœia by the limitation of the size of the starch granules, the starch granules of the Carthagenia root being much larger than those of the official Brazilian.

*Methyl Alcohol*.—Suggestions that have been made from time to time as to the possible use of this compound in pharmacy have, unfortunately, been adopted by a class of dealers that are always anxious to increase their profits regardless of any hazard or risk that may be incurred by their customers. Not alone in tincture of iodine, soap liniment, and other preparations used for external purposes, it has also been found in tincture of ginger, essence of peppermint, and other drugs and flavoring essences usually sold for popular consumption. Würdeman (*Amer. Med.*, 1901) reports several cases of blindness resulting from the use of this compound, and also gives a summary of a number of other cases that have been recently reported. Sieker (*Chem. Zeitg.*, 1901) suggests as a reliable test the reduction of cupric oxide by vapor of methyl alcohol and the production of formaldehyde, readily recognized by its peculiarly pungent and penetrating odor.

*Oleic Acid*.—Artault (*Rev. Therap. Med. Chirurg.*, 1901) suggests the use of purified oleic acid in cases of hepatic colic due to gallstones. He gives the acid in doses of 0.5 to 1.0, and in cases where the attacks occur at intervals of a month or more he suggests giving the remedy for from ten to fourteen days.

*Picric acid* is being brought forward as an external dressing and a remedy in affections of the skin. It has proved itself to be especially valuable in superficial burns, acute eczema, and herpes zoster; used in  $\frac{1}{2}$  or 1 per cent. solution.

*Phosphorated oil*, as a substitute for this preparation, when it is to be used for internal purposes, Escalle (*Zeitschr. des Allgemein. Oestr. Apoth. Verein*, 1901) proposes glycerin as the solvent. He produces a 1 per cent. glycerin-alcohol solution by allowing 10 phosphorus to be heated under 100° glycerin until melted, then shake until cool, add 400° glycerin and 500° alcohol 96 per cent.; keep in a cool, dark place.

*Quinine*.—Binz (*Therap. der Gegenwart*, 1901) recommends large doses of a quinine salt with cold baths in cases of typhoid fever. He thinks that quinine is an active poison to the lower organisms, and gives the drug in doses of 1.0 every other evening.

*Salicylates*.—Wolff (*Chem. Zeitg.*, 1901) reports that freshly precipitated hydroxids of iron, aluminum and copper are soluble in solutions of sodium or ammonium salicylate. It is said that the copper sodium salicylate reacts similar to Fehling's solution with

substances containing sugar. And it is further suggested that the iron sodium salicylate might be of some use in medicine.

*Senna*.—Alexandria senna has been demonstrated to contain upward of 20 per cent. more of the supposed active principle, oxymethyl anthra chinon, than the corresponding leaves of the Tinnelly variety. The former should, therefore, be considered the more efficient.

*Strophanthus*.—According to F. Feist (*Ber. d. Deut. Chem. Gesells.*) there is a marked difference in the preparations of this drug when made from *Strophanthus Kombe*, or *Strophanthus hispidus*, as they vary considerably in the kind and amount of the glucoside contained in them, the pseudostrophanthin of *Strophanthus hispidus* being twice as active as Strophanthin contained in *Strophanthus Kombe*.

*Wines*.—Dr. Carl Rundquist (*Apoth. Zeitg.*, 1901) has made a series of experiments with the idea of replacing the official wines of the "German Pharmacopœia" by sweet wines in the making of official preparations of medicated wines. According to his experiments Port wines and wines of this character having a high percentage of sugar appear to have greater solvent properties for alkaloids and active principles of drugs than sherry and Malaga wines.

## RECENT LITERATURE RELATING TO PHARMACY.

### NEW REMEDIES OF 1901.<sup>1</sup>

Abroma Augustum—See Olut Kombool.

Acetamidophenoxyacetamide—Antipyretic.

Acetamidophenoxyacetamide-chloral—Sedative.

Acetanilidsulphonsodium—Soluble antipyretic.

Acetospirin—Acopyrine. Compound of aspirin and antipyrine.

Antirheumatic. Dose: 0.5 grammes, 5–6 times daily.

Acetylated Methylene diguaiacol—See Euguform.

Acid, Cinamylcadylic—See Cinamylcadylic acid.

Acid, Iodosobenzoic—Local Antiseptic.

Acid, Morphoxylacetic—See Morphoxylacetic acid.

Acid, Orthohydrazineparabenzoic—See Orthine.

Acid, Salolorthophosphinic—See Solvosal.

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<sup>1</sup>*Merck's Report*, January, 1902.

Acopyrine—See Acetospirin.

Acrolein-Sulphurous Acid—Local antiseptic, as wash, ointment, or dusting powder.

Adrenalin—1:1900 solution. Active principle of suprarenal capsule.

Aethiopian Pepper—See *Xylophia aethiopica*.

Agurine—Theobromine-sodium and sodium acetate. Diuretic. Dose: 0.25–0.5 gramme.

Albargin—Silver gelatose. Antiseptic and antigonorrhœic in 0.1–0.2 per cent. solution.

Albizzia Anthelmintica—"Musena" bark. African plant used as an anthelmintic.

Alboferrin—Iron-phosphorus-albumin compound. Tonic and nutrient.

Algicide—Anodyne and antiphlogistic.

Alkaseptol—Antiseptic, germicide, and detergent.

Alpha-Eunol—Compound of alpha-naphtol and eucalyptol. Antiseptic.

Alummatine—Antiseptic surgical dressing.

Amyl Salicylate:  $C_6H_4OH.CO_2C_6H_{11}$ . Antirheumatic and sedative.

Anaemin—Solution of "iron-pepsin saccharate." Antichlorotic.

Anthrapurpurin Diacetylesther—See purgator.

Anticholerin—Cholera antitoxin solution. Disinfectant.

Antiformin—Disinfectant.

Antipyrine Salicylacetate—See Tyrosal.

Aponia—Dental anæsthetic.

Aquinol—Disinfectant.

Avenose—Infant food.

Azymal—Buccal disinfectant.

Bacillol—General disinfectant.

Beta-Eucaine Acetate—Local analgesic and anæsthetic. Used in 2 per cent. solution.

Bioplasm—Antitubercular, antimalarial, and febrifuge.

Bismutal (Bismutol)—Mixture of sodium salicylate and soluble phosphate. Antiseptic.

Bismuth Cinnamate—See Hetoform.

Bismuth Dilactomonotannate—See Lactannin.

Bismuth Lactogallate—Used like bismuth preparations.



Bismuth Lactotannate—See Lactannin.

Bismutol—See Bismutal.

Bismutose—Bismuth-albumin preparation. Gastro-intestinal and local antiseptic. Dose:  $\frac{1}{2}$ –1 drachm for children.

Bocyl—Alcoholic solution of cinnamic and boric acids. Buccal disinfectant.

Boliformin—Compound of formaldehyde and aluminum silicate. Dusting powder for wounds, and veterinary siccativ.

Boric Acid Ethyl-Ester—See Borogen.

Borobenphenene—Antiseptic and germicide.

Borogen—Boric-acid ethylester. Disinfectant for respiratory organs. Used by inhalation.

Branalcane—Disinfectant for diphtheritic and infective diseases.

Bromyl—Nervous sedative and antiepileptic.

Cacodiacol—Guaiaicol cacodylate.

Calcinol—Calcium iodate. Succedaneum for iodoform.

Calcium Glycerinoarsenate—Arsenical medicament. Dose: 0.01 grammes.

Calcium Iodate—See Calcinol.

Calystegia Soldanella—Cathartic. Dose: 3–4 grammes of powder; of resin, 1.5 grammes.

Camphoric-Acid Phenetidid—Compound of camphoric acid and parphenetidid. Antipyretic and antihydrotic.

Canutillo—See *Ephedra nevadensis*.

Caynote—See *Ephedra nevadensis*.

Cerevisine—Desiccated yeast, used like beer yeast in boils, furuncles, etc.

Chloromethylmenthyl Ether—Forman. Compound of formaldehyde, hydrochloric acid, and menthol. Used in coryza.

Chloropepsoid—Remedy for gastritis, gastric neuroses, and alimentary disturbances.

Choclon—A "vegetable milk" used in Argentine Republic as a nutrient.

Chrysolein—Sodium fluoride.

Chuchuarine—Alkaloid from *Senecarpus anacardiac*. Aphrodisiac.

Cinchonine Dihydrochlorate—Antipyretic, antiseptic, and malarial prophylactic.

Cinchonine Sulphocresotate—Antipyretic, antiseptic, and malarial prophylactic.

Cinnamyl-cacodylic Acid—Used like cacodylates.

Colyticine—Parasiticide, antiseptic, and disinfectant.

Contrayerva—See *Dorstenia brasiliensis*.

Corpulin—Antiobesity tablets, said to consist of extract bladder-wrack, tamarinds, and cascara sagrada.

Cretamethyl—Local antiphlogistic.

Cuprargol—Copper-albumin compound: Antiphlogistic and secretory stimulant. Used in 1–5 per cent. solutions.

Cypridol—1 per cent. solution of “nascent” mercuric iodide in neutral aseptic oil. Dose: 0.2 gramme.

Didymium Salicylate—See Dymal.

Dioxogen—Trade name for hydrogen dioxide.

Dithan—Trional.

*Dorstenia Brasiliensis*—Contrayerva. Digestive tonic and diaphoretic. Dose: Tonic, 2 grammes; diaphoretic, 4–8 grammes daily.

Doundaké—*Sarcocephalus esculentus*. Bark is tonic, febrifuge, and astringent. Dose: Wine (3 per cent.), 1–2 fluid ounces; extract, 2½–3 grains; bark, 50–60 grains; aq. extract, 3–4 grains.

Doundakine—Alkaloid from Doundaké (q. v.). Quinine substitute. Dose: 3–4 grains.

Dymal—Didymium salicylate. Antiseptic and siccative.

Dymol—Remedy for intestinal disorders. Dose: 1–3 grains.

Enterol Carbonate—Carbonic-acid ester of enterol (mixture of cresols used as an intestinal antiseptic).

Entona—White-wheat-gluten suppositories.

Ephedra Nevadensis—Caynote; Canutillo; Tapopote. Blood purifier and antigonorrhœic. Dose: Teaspoonful of fluid extract.

Erysimin—Glucoside from seeds of *Erysimum*. Physiological properties like those of digitalin.

Esanofele—Antimalarial.

Euguform—Acetylated methylenediguaiacol. Antiseptic vulnerary.

Enophthalmin—Improper spelling (in many journals) for euphtalmin.

Eupyrin—Paraphenetidin vanillin-ethylcarbonate. Antipyretic. Dose: 1–1.5 grammes.

Farola—Nutrient.

Floricin—Ointment base.

Formaldehyde-soap—Compound of formaldehyde and soap. Disinfectant.

Forman—See Chloromethylmenthyl ether.

Gasterin—Preparation made from stomach of the dog, and used like pepsin.

Germiletum—Compound antiseptic solution.

Giaourdi—Preparation of fermented milk. Nutrient.

Glycine Subterranea—See Voandzou.

Glycobenphene—Remedy for cutaneous diseases.

Glycogenol—Substance obtained from animal organism, and nearly allied to glycogen. Used in tuberculosis and typhoid fever. Dose: 0.2 gramme hypodermically or per os.

Glycosolvol—Peptonized theobromine-trypsin oxypropionate.

Guaiacol Cacodylate—See Cacodiacol.

Heliosin—Indefinite mixture of various inorganic salts with keratin. Antisyphilitic.

Hemoglobin Albuminate—See Perdynamin.

Hermophenyl—Mercury phenoldisulphonate. Bactericide and antiseptic in 1-5 : 1000 solution.

Hetoform—Bismuth cinnamate,  $\text{Bi}(\text{C}_9\text{H}_7\text{O}_2)_3\text{B}_2\text{O}_3$ .

Hydrargotin—Mercury tannate.

Ichthosin—Ichthyol compound of eosine used in skin diseases.

Isopilocarpine—Isomer of pilocarpine. Action like that of pilocarpine, but much weaker.

Impatiens Fulva—See Jewel-weed.

Iodized Meat Powder—Succedaneum for iodides and organic iodine compounds for internal use.

Iodochloroxyquinoline—See Vioform.

Iodogenol—Compound of iodine and peptonized albumin. Succedaneum for iodine preparations for internal use.

Iodokol (or Iodocol)—Iodine-guaiacol compound. Used in pulmonary tuberculosis, tubercular pneumonia, croupous pneumonia, and bronchial asthma. Dose: 0.2-0.4 gramme 4-5 times daily.

Iodosobenzoic Acid—Local antiseptic.

Iron Paranucleinate—See Triferrin.

Ironal—Ferruginous preparation containing 80 per cent. iron.

Jamrosin—Fluid extract of an East-Indian Myrtaceæ used as an antidiabetic. Dose: six drops thrice daily.

Jequirtol—Sterile abrin solution of uniform physiological action. Used for inducing conjunctival inflammation.

Jewel-weed—*Impatiens fulva*. Freshly expressed juice is an antidote to poison-ivy.

Kaki—Japanese persimmons, recommended for stubborn vomiting in pregnancy, and in diarrhœa.

Kanagugi—*Lindera erythrocarpa*. The fluid extract is used by the Japanese in secondary syphilis. Dose: teaspoonful.

Karos—South African plant used in dysentery and in ulcerative and hæmorrhagic intestinal affections.

Kreospinal—Preparation of creosote and spinach. Remedy for phthisis.

Kretol—Surgical dressing, antiseptic, and germicide.

Lactanin—Bismuth dilactomonotannate. Used in diarrhœa and malaria. Dose: 1–5 grammes daily for children.

Levico-Ocher—Iron-arsenic mud from Levico. Used as hot application in neuralgia, inflammatory processes and exudates, and also sexual diseases.

*Lindera Erythrocarpa*—See Kanagugi.

Liquor Thiophosphini—Solution containing chiefly potassium guaiacol sulphonate. Dose: 5–10 grammes.

Lithrea Caustica—Litre. An Anacardiaceæ found in Chili, and used in form of a tincture as a counter-irritant.

Litre—See *Lithrea caustica*.

Lozon—Trade name for hydrogen dioxide.

Lycresol—Soap solution containing crude cresol. Antiseptic.

Mangrove—*Rhizophora mangle*. Used in leprosy.

Melan—"Condensation product" of the buds, leaves, and twigs of *Melilotus cæruleus*. Cicatrizant and vulnerary.

Melonemetin—Bitter principle from melon. Emetic and purgative.

Menthyl Acetoacetate— $\text{CH}_3\text{C}(\text{OH}) : \text{CH}.\text{COOC}_{10}\text{H}_{19}$ . Bactericide.

Mercuramin—Mercury ethylenediamine citrate.

Mercury Cacodylate—Antitubercular. Dose: 0.03 gramme per day intramuscularly.

Mercury Ethylenediamine Citrate—See Mercuramin.

Mercury Phenoldisulphonate—See Hermophenyl.

Methylene Creosote—See Pneumin.

Methylene Diguaiacol—See Pulmoform.

Methylene Diguaiacol, Acetylated—See Euguform.

Modoformol—Antiseptic dressing.

Morphine Caseinate—Soluble compound of morphine and casein.

Morphoxylacetic Acid— $C_{17}H_{18}NO_3 \cdot C_2H_5COOH$ . Narcotic, like morphine, but weaker.

Muscarium—Extract of *Amanita muscaria*. Used in digestive atony. Dose: 0.01–0.05 gramme.

Musena—Bark of *Albizzia anthelmintica*. Anthelmintic.

Mycoserum—Muscle juice. Nutrient antitubercular.

Oenotannol—Tuberculosis remedy consisting of tannic acid and grape juice or grape pulp.

Oleite—Jelly-like ointment base obtained by action of sulphuric acid on castor oil.

Olut Kombool—*Abroma augustum*. East-Indian remedy for dysmenorrhœa.

Oroxylin—Crystalline substance from *Oraxylon indicum*. Astringent and tonic.

Orthine—Orthohydrazineparabenzoic acid. Phenylhydrazine derivative. Antipyretic. Dose: 4–7 grains.

Orthohydrazineparabenzoic Acid—See Orthine.

Ovos—Succedaneum for meat extract, prepared from yeast.

Oxytoluylmethylvinylidiacetonealkaminehydrochlorate—See Enophthalmin.

Pancreon (Pankreon)—Pancreatin-tannin compound. Tryptolytic, used in gastro-intestinal digestive disturbances. Dose: 0.3–0.5 gramme, thrice daily.

Paraphenetidin-Vanillin-Ethylcarbonate—See Eupyrin.

Parietin—Chrysophanic acid.

Pegmin—Species of rennet for rendering cow's milk easily digestible.

Pelargonium Flabellifolium—South-African plant, the root of which is used as a remedy in dysentery.

Pentodyne— $4(Na) \cdot C_{34}N_5H_{40}O_{10} \cdot OH(?)$ . Analgesic, antipyretic, and neuralgic. Dose: 2–10 grains.

Perdynamin—Hemoglobin albuminate.

Peroxine—Non-volatile (?) hydrogen dioxide.

Phenamide—Coal-tar derivative. Antipyretic and analgesic.

Phenol-Celluloid—Phenol-camphor solution of pyroxylin used as a varnish for protecting wounds, etc.

Phosphorylquinine—Quinine-phosphoric-acid ester.

Phrynine—Alkaloid extracted from cutaneous glands of several species of toad. Antiepileptic.

Pneumin—Methylene-creosote. Antitubercular.

Protan—Tannin-nucleoproteid. Antidiarrhoeal. Dose: 20–30 grains.

Protose—Vegetable food for anemia, diabetes, obesity, dyspepsia, etc.

Pulmoform—Methylene diguaiacol.  $\text{CH}_2(\text{C}_6\text{H}_3.\text{OHOCH}_3)$ . Antitubercular.

Purgatol—Anthrapurpurin diacetyler. Mild purgative. Dose: 0.5–1 gramme.

Purgo—Phenolphthalein. Purgative. Dose: 0.1–0.6 gramme.

Pyramidon Camphorate—Succedaneum for antipyrine and pyramidon in tuberculosis. Dose: 1 gramme.

Quinine Acetylsalicylate— $\text{C}_{20}\text{H}_{24}\text{N}_2\text{O}_2.\text{C}_6\text{H}_4.\text{O}.\text{C}_2\text{H}_3\text{O}.\text{COOH}$ . Quinine compound for internal use.

Quinine Phosphoric-Acid Ester—See Phosphorylquinine.

Quinine Salicylic-Acid Ester—See Saloquinine.

Quinine Methyldihydrazine Perchlorate—Compound obtained by fusing together quinine hydrochlorate, caffeine, and antipyrine.

Radal—20 per cent. solution of protargol.

Ramogen—Infant and invalid food.

Remarcol—Sodium fluoride.

Rheumatin—Salicylquinine (saloquinine) salicylate. Antirheumatic. Dose: 1 gramme.

Rhizophora Mangle—See Mangrove.

Saccharosolvol—Organotherapeutic preparation obtained by action of salicylic acid on diastatic ferment of pancreatic juice and spinal marrow of cattle.

Salicylquinine Salicylate—See Rheumatin.

Salicylic-Acid Benzyl Ester—External antiseptic.

Salinigrin—Glucoside from bark of *Salix nigra*.

Sololorthophosphinic Acid—Solvosal.

Saloquinine—Quinine ester of salicylic acid. Febrifuge and analgesic. Dose: 2 grammes.

Saloquinine Salicylate—See Rheumatin.

Sanatolyn—Disinfectant and deodorizer.

Sarcocephalus Esculentus—See Doundaké.

Sarton—Nutrient.

Selenopyrine—Product of reaction between potassium selenide and antipyrine "chloride."

Silver-Gelatose—See Albargin.

Sitogen—Vegetable-meat nutrient extract.

Sodium-Caffeine Salicylate—See Xanol.

Solvosal—Salolorthophosphinic acid.

Solvosal-Lithium—Compound of solvosal (q.v.) and lithium. Intestinal antiseptic and diuretic. Dose: 0.25-0.5 gramme: 3-5 grammes daily.

Solvosal-Potassium—Compound of solvosal (q.v.) and potassium. Intestinal antiseptic.

Tapopote—See *Ephedra nevadensis*.

Tartaric-Acid Diphenylester—Condensation product of tartaric acid and phenol. Antipodagric.

Tartrophen—Compound of phenetidin and tartaric acid. Used like citrophen.

Tetramethylcyanpyridon—Myotic.

Theobromine-Sodium and Sodium Acetate—See Agurine.

Theobromine-Trypsin-Oxypropionate, Peptonized—Glycosolvol.

Thiopyrine (Thioantipyrine)—Product of reaction between potassium sulphhydrate and antipyrine "chloride."

Thymatol—Thymol carbonate. Tyratol. Anthelmintic. Dose: 2 grammes; 0.5-1 gramme for children.

Thymol Carbonate—See Thymatol.

Thymol Chlormethylsalicylate—Condensation product of thymol and chlormethylsalicylic acid. Antiseptic.

Triferrin—Iron Paranucleinate. Hematinic. Dose: 5 grains three times daily.

Triphenylguanidine Guaiacolsulphonate—Local anæsthetic.

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## PHARMACEUTICAL MEETING.

The fourth of the series of pharmaceutical meetings of the Philadelphia College of Pharmacy for 1901-1902 was held on Tuesday, January 21st. Mr. William L. Cliffe, well known for his activity in pharmaceutical matters, presided.

The first speaker was Mr. Benjamin T. Fairchild, New York City, a member of the firm of Fairchild Brothers & Foster, who gave a very comprehensive paper on "The Evolution and Use of the

Digestive Ferments in Medicine" (see p. 53). The author treated of the genesis of the subject in its relationship to pharmacy and medicine and briefly referred to the brilliant researches of Spallanzani, Schwann, Kühne, Büchner, and others. Spallanzani was the first to make a distinction between peptic digestion and putrefaction; Schwann first demonstrated the existence of pepsin in the gastric juice; Kühne introduced the name enzymes; Büchner has shown, the presence of zymase in yeast capable of setting up alcoholic fermentation.

Mr. Fairchild considered the different theories in regard to fermentation: the production of digestive ferments by the animal cell their action upon the various kinds of tissues with which they may be brought into contact, and the different conditions and substances which influence and destroy their action. This was then followed by the consideration of the utilization and isolation of these physiological principles, and especially the advances made in bringing them into available form in medicine.

The use of pepsin in medicine and pharmacy was referred to in detail by the speaker, who said that the first pepsin to be prepared in a commercial way was of French origin. The introduction of pepsin into the different Pharmacopœias was discussed, their strengths noted, as also the manner of testing. The different methods for extracting and preparing pepsin for the market were considered, and the author in this connection presented the different theories in regard to the origin of pepsin, the peculiar conditions necessary for the action of digestive ferments, and the care that should be exercised in combining them with substances that either have only an inhibitory effect or destroy their action entirely.

The pancreatic ferments were dealt with, the author discussing their properties, compatibilities, and their use in the artificial digestion of foods. He said that while pancreatic juice is held to be alkaline in character, nevertheless he finds the fresh gland and infusions therefrom to be invariably acid.

In discussing the paper, Dr. Lowe referred to the erroneous notions held by many in regard to the influence that ferments have in digestion. J. W. England moved that a special vote of thanks be tendered to Mr. Fairchild for his valuable paper, and said that it seemed especially appropriate for it to be presented at this time, as it was just thirty years ago that E. Scheffer published a paper in t<sub>he</sub>



AMERICAN JOURNAL OF PHARMACY on the preparation of pepsin (1872, p. 49). The motion was unanimously adopted.

The next paper was on "The Filtration of Drinking Water," by William G. Toplis (see p. 67). The author, in connection with the paper, demonstrated the construction of a sand-filter, and said that in the purification of water no less than three separate and distinct classes of organisms are concerned: the first changing the organic matter into ammonia; a second group changing the ammonia into nitrous acid; and finally, a third forming from the latter nitric acid. He also alluded to the different methods for the biological and chemical examination of water.

A paper on the "Solubility of Compressed Tablets" (see p. 80), by A. M. Hance, was read on behalf of the author by W. C. White. The author said that the term solubility, as applied to tablets, indicates the power to disintegrate rather than power to form solutions.

Rolland H. French presented a paper on "Seidlitz Powders" (see p. 74). The author said that for all commercial purposes the analysis of Seidlitz mixture might be reduced to simply a  $\text{CO}_2$  determination, from which the sodium bicarbonate was calculated and the Rochelle salt found by difference.

"Progress in Pharmacy" was the title of an excellent paper (see p. 82) by M. I. Wilbert, Apothecary to the German Hospital. The author briefly reviewed some of the advances made during the past year, and among other things called attention to the fact that the requirements of the German Pharmacopœia are of such a nature that many German apothecaries have found it advisable to attend short post-graduate courses, embracing work with the compound microscope and volumetric analysis.

Owing to lack of time the "Discussion on Modern Drug Store Methods" was postponed until the next meeting.

Among the exhibits was that of Merck & Co., who exhibited a specimen of gaduol (the alcoholic extract of cod-liver oil) and the various preparations which can be made from it, as with hypophosphites, peptonized iron, dionin and thiocol. The exhibit also included thiocol (guaicol-sulphonate of potassium) and dionin (ethyl-morphine hydrochlorate).

Gilpin, Langdon & Co. exhibited a line of spices; they also had a number of samples for distribution. An exhibition of metal goods, including pill machines, bottle stoppers and collapsible tubes, was made by A. H. Wirz.

The following provisional program has been arranged for the next meeting, February 18th :

"The Basis of Atomic Weights." By Prof. Edgar F. Smith, University of Pennsylvania.

"Adulteration of Drugs and Foods." By Dr. Albert Robin, Delaware State Board of Health.

"Deodorized Opium Preparations." By Albert E. Ebert, Chicago.

"Dose Measures and Measure Doses." By M. I. Wilbert.

"Discussion on Modern Drug-Store Methods." H. K.

## PHILADELPHIA COLLEGE OF PHARMACY.

The quarterly meeting of the members of the Philadelphia College of Pharmacy was held December 30, 1901, the President, Howard B. French, in the chair. Twenty-two members were present. The minutes of the semi-annual meeting, held September 30th, were read and approved.

The minutes of the Board of Trustees for the meetings held September 3d, October 1st, and November 6th, were read by the Registrar, W. Nelson Stem, and approved.

Announcement was made of the death of our fellow-member, Charles W. Warrington, which occurred at his residence, 1700 Mount Vernon Street, on November 13th. He became a member in 1900.

A communication was read from Mr. F. W. E. Stedem, resigning his membership in the College—to take effect immediately. All the requirements for resignation having been complied with, it was on motion accepted.

At the semi-annual meeting held September 30, 1901, it was "resolved that a committee of five be appointed to take into consideration all matters pertaining to the meeting of the American Pharmaceutical Association in 1902, in which the College may be interested." The President appointed the committee as follows : H. L. Stiles, Chairman ; Mahlon N. Kline, Wm. L. Cliffe, George M. Beringer, and Walter A. Rumsey.

The Committee on Membership presented a communication proposing the names of three persons for election to Honorary Membership.

The Committee further recommends that renewed efforts be made to increase the Associate Membership in the College, calling attention to the privileges conferred on this class of members, which are :

1. The regular receipt of THE AMERICAN JOURNAL OF PHARMACY.
2. Access to Library.
3. All other privileges of membership except that of voting.

A certificate is given to Associate Members, and it seems only necessary for these facts to be presented properly to the students and others for them to become members.

C. A. WEIDEMANN, M.D.,

*Secretary.*

# THE AMERICAN JOURNAL OF PHARMACY

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MARCH, 1902.

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## THE EVOLUTION AND USE OF THE ANIMAL DIGESTIVE FERMENTS IN MEDICINE.

BY BENJAMIN T. FAIRCHILD.

*(Concluded from page 67.)*

The period covering the past twenty years has been one of quickened and extended interest and progress in the applied science of the digestive ferments. In this time we see the beginning of their practical use in the artificial digestion of foods for the sick by methods available in the household by means of various special preparations of the pancreas ferments. The animal digestive juices and ferments are now largely utilized in the technical laboratory in the production of peptonized foods in an agreeable, adequately nutritious and stable form, especially adapted as widely available foods for the sick. The observations of Roberts on the pancreatic ferments as peptonizing agents, led thus to a realization and development of their remarkable availability in the feeding of the sick. The dependence of pepsin upon an acid reaction, and the limitation of its action to proteids only, has restricted its use in the artificial digestion of food purely to laboratory methods. Pancreatic preparations in both dry and fluid form, prepared by direct extraction from the glands or by precipitation with strong alcohol from infusions of the gland, have come into very general use as therapeutic agents.

The manufacture of pepsin has been greatly improved, and its standard of value raised to an adequate point. The milk-curdling

enzyme has now become much employed in therapeutics as a means of administering soluble metallic salts (such as mercurials, iodides, etc.), bound up with the curd of milk or junket; also used in the preparation of whey, presenting the soluble constituents of milk—non-coagulable proteids, salts and sugar—in a fluid form as a food for the sick and in infant-feeding.

The topical application of the gastric juice so convincingly presented at the very outset of its investigation, after long escaping notice, has been brought to renewed attention and use by means of artificial gastric juice prepared directly from the fresh stomach. This interesting and important therapeutic utilization is based upon the well demonstrated facts of the solvent action of the gastric juice and its bactericidal, healing and deodorizing properties.

Trypsin is also now employed in the treatment of pus cases, especially where the indications are for the application of a solvent of a neutral or alkaline reaction. The proteolytic ferment of the pancreas is now utilized in the qualitative conversion and quantitative adjustment of cow's milk to normal human milk in digestibility and in the ratio and content of nutritive constituents.

The many products and uses of the peptic and pancreatic ferments thus brought into medicine cannot be considered here in detail. In addition to the directions already mentioned, they are utilized as therapeutic agents to promote the efficiency and toleration of medicinal agents, especially those which directly disturb digestion and circulation; as aids to digestion in acute and chronic diseases, and in various forms of dyspepsia.

From our present knowledge and view of the enzymes of the animal digestive secretions we know that the proteolytic enzymes do not exist pre-formed in the secreting cell; it may be said that they exist as "zymogens." It is uncertain as to whether there is also a zymogen of the starch-converting and curdling and emulsifying ferments. In the writer's opinion, the preponderance of evidence at the present time is that this has not been established for other than the proteolytic enzymes.

In their chemical constitution, the enzymes are presumably identical, being proteid, or closely akin to proteid in their nature and behavior. As we have already seen, some of the most recent investigators have declared their belief that they are of the nature of nucleoproteids. Whilst we have the statement long ago made by Brücke

and recently by Oppenheimer that a proteolytic ferment possessing the power to dissolve fibrin, but failing to give the proteid reactions had been isolated, it is very singular that others have not verified this, especially when we consider the careful attention the subject has received from the most eminent physiologists and chemists.

The enzymes are all soluble, destroyed when in solution, by heat; resistant to high temperature ( $100^{\circ}$  C.) when in a dry form, and, with probably one or two exceptions, non-diffusible.

If we prepare an infusion of the peptic gland and submit this to heat under the physiological conditions necessary to convert into peptone all the associated proteids digestible by the enzyme, and remove these by dialysis, we shall still find this infusion to contain a non-dialysable body, exerting peptic action, precipitable upon boiling. This precipitate, so obtained, washed and submitted to pepsin-hydrochloric acid digestion, proves absolutely refractory to pepsin action. This substance has the properties of a proteid and contains nucleic acid. Identical results are likewise obtained with the pancreas enzymes.

Whether the enzymes then are nucleo-proteids, or whether nuclein may be the "material substratum" of the enzymes, cannot at present be stated. We have not obtained an enzyme in any form as yet which is not in its constitution and character analogous to proteid.

The gastric juice is generally held to contain two distinct enzymes, although some writers have recently suggested that both the curdling and proteolytic action are manifestations of the one enzyme under different conditions. This seems very doubtful from our own observations, and is without analogy in the behavior and functions of the ferments in general. Whilst pepsin is present in the stomach of all ruminant and carnivorous animals, we, however, regard the milk-curdling ferment as particularly a constituent of the nursling animal; for we have observed that in the calf and other animals the curdling activity steadily diminishes in direct ratio to the growth of the animal.

The enzyme becomes potential or vitalized only at the moment of its discharge or extrusion from the cell. Pepsinogen is not bound up with the acid, for the enzyme may be freed from hydrochloric acid without destroying its vitality; nevertheless, there is a strong chemical and physiological tie between them.

The hydrochloric acid of the gastric juice we know does not exist as free acid, but is in some way bound up to the proteids, this acid again uniting with the proteids and bases of foods and displacing organic acids. So that we must be mindful of the distinction existing between the acid of pure gastric juice and the acid contents of the digesting mass.

Seeing that the gastric juice is essentially an acid-pepsin secretion, it might be, and indeed it generally has been presumed, that solutions containing hydrochloric acid of the percentage of gastric juice would constitute favorable vehicles for the peptic ferment, as pharmaceutical products. But a mixture of pepsin, hydrochloric acid and water has not the stability of gastric juice; it differs therefrom in important particulars—in the absence of proteids associated with pepsin and united with the acid, and in the absence of inorganic constituents of the gastric juice; and we must consider gastric juice in its entity as being of a peculiar composition, essential and indispensable to the complete exhibition of its function.

Pepsin in solution with hydrochloric acid of the percentage of normal gastric juice, if brought in contact with albumen, digests it with facility, but here a portion of the acid is immediately united with the albumen and with the alkali of the albumen. If, however, we submit pepsin to long-continued contact simply in this dilute hydrochloric acid we find the pepsin to progressively deteriorate in activity. Therefore, acid cannot with impunity be added to pepsin in solution in the manufacture of products necessarily to be submitted to conditions of commerce.

The pancreas gland contains four distinct ferments. Its proteolytic enzyme is probably not elaborated in an active form, but becomes endowed with vitality by contact of the pancreas juice with the acids of the chyme, which are undoubtedly organic in a very considerable degree, and are known to be powerful developers of the latent energy or vitality of the pancreas trypsinogen.

The diastasic ferment undoubtedly exists pre-formed, and we know of no reason to assume that it requires to be developed, nor of any chemical or physiological data which would indicate this view.

The fat-digesting ferment varies greatly in the glands of different animals, and its action upon fat in reducing fat globules to a minute form is difficult to account for, especially as the ferment is not in

any known way related to an acid or an alkali; and inasmuch as alkalies themselves emulsify fats, it is difficult to differentiate between the action of the ferment and the alkali in any conditions in which both are present.

From our observations we are strongly inclined to the view that fats in contact with weak acids are more readily emulsified than pure fats; that the pancreas ferment has the power of splitting up fats is certainly undoubted.

During the normal conditions of digestion it would seem that the distribution of fat in a finely divided state is brought about (both by chemical and physiological means) through the natural commin-gling of the mass, the diffusion of the fats by heat, and the effect both of the bile and pancreatic secretions upon the fat as so contained in the acidulous chyme.

The milk-curdling ferment of the pancreas appears to be in every way analogous in its action to that of the rennet; in practical operations, however, it is difficult to utilize it like the rennet ferment, or to separate it for study. The clot of milk, as originally formed by the pancreas juice, is absolutely identical in apparent character with that of the rennet coagulum, but after a short time the caseine and other milk proteids are rapidly attacked by the trypsin of the pancreas juice and gradually reduced to solution, which phenomenon does not occur in contact, however prolonged, of milk with the rennet ferment, for here the coagulum gradually separates in a mass from the milk serum. The pancreas enzymes are secreted in a juice which is exceedingly complex in nature, being rich in saline constituents (in ash) and also in organic matters, those which constitute the enzymic and related bodies.

Whilst the pancreatic juice is said by many observers to be an alkaline fluid, we invariably find that infusions from the gland, prepared immediately upon being taken from the animal, or in the ordinary methods of procedure, give a distinctly acid reaction (with no alkaline reaction) due, we believe, to acid phosphates, which yield an acid ash. The fresh gland itself invariably gives an acid reaction to test paper, and I am unable to account for this except upon the hypothesis that the *juice* becomes alkaline either at the time of exudation from the gland or by some changes set up by the media with which it thus comes in contact. It is known that these ferments are not in the least degree dependent upon an alkaline reac-

tion—have no relation to an alkali in any way analogous to that between pepsin and hydrochloric acid. It cannot be too strongly pointed out that free alkali does not present a favorable medium for the extraction or preservation of the pancreas ferments in any form suitable for pharmaceutical uses. On the contrary, in alkaline solutions, the pancreas ferments all undergo rapid deterioration when submitted to the ordinary conditions of commerce. The pancreatic-enzymes are so active in neutral or faintly acid media that the intervention of a feeble alkali, whilst it increases their action, does not (in the most favorable percentage) by any means do so to any great extent; and, as a matter of fact, the pancreas ferments are all readily utilizable for all purposes of artificial digestion without the intervention of any alkali whatever. In fact, with alkaline solutions the pancreas ferments are more readily destroyed than is pepsin in free acid.

It should here be mentioned that the use of an alkali in the ordinary peptonizing processes with pancreas extract is not so much to increase the activity of the ferment, as it is for its convenience in enabling us to raise the temperature of the milk to the boiling point at any time during the partial digestion of the caseine, without coagulating the partially converted caseine, for caseine acquires the remarkable characteristic of curdling upon boiling, after it has been acted upon by the trypsin; this coagulation, occurring only at the boiling point, is quite distinct from the milk-curdling reaction, the ferment having been destroyed before this reaction is reached.

As for the practical side of the zymogen subject, it need only be said that in operations with the pancreas glands, especially when we seek to utilize the proteolytic ferment, the glands are best preserved at ordinary-room temperature, according to the season, for a sufficient length of time to develop the ferment, taking care to maintain aseptic conditions. On the other hand, if the starch-converting ferment is desired, the pancreas gland may be immediately put into operation.

When we see that the latent zymogen becomes the potential enzyme when in contact with the food in normal digestion, and when existing in the gland is not utilizable unless likewise vitalized and developed by appropriate means out of the body, we are at a loss to attribute any virtue to the "mother" ferment in medicine; for the very evident reason that as a mother ferment it is valueless, and becomes valuable only when it loses the characteristics of a zymogen and becomes an "enzyme."



The behavior of the various digestive juices toward each other, their related rôle in the digestion process, has been the subject of immense research, theory and conjecture, and opinions of the widest possible variance have been expressed. This variance can be accounted for in a great degree by the nature and oftentimes inconclusive methods of experiment; the fact is sometimes lost sight of, that the contact of these enzymes in solution and in various media, acid, neutral or alkaline, introduces conditions foreign to those met with in the alimentary tract.

The first and only positive conclusion to be drawn from such experiments is, that solutions of mixed ferments which are found to exert injurious effect upon each other, under the ordinary conditions to which they must be submitted in use, should not be prepared and presented as pharmaceutical products.

We have particularly noted that the behavior of free hydrochloric acid towards the ferments is distinct from that of the gastric juice itself where the acid exists in peculiar physiological relation to the various proteids. This is the common observation of physiologists. Free hydrochloric acid behaves, for instance, very differently to starch digestion (of any diastase) from the equivalent amount of acid as combined in the gastric juice.

The fact that diastase is injured in solution by maceration with pepsin and hydrochloric acid does not make it by any means conclusive that the saliva is useless in the stomach; for it must be considered that the various juices from the salivary, gastric, and pancreatic glands are secreted under the stimulus of food, are brought together mingled with foods of a complex nature and in various stages of digestive conversion; and that the various constituents of the juices and of the foods have important functions in the whole digestive scheme. Furthermore, there are various stages of activity and reactions of media in the normal progress of digestion.

In the therapeutic use of the digestive ferments we are by no means dealing with normal digestion, nor are we restricted solely to one period or one method in the introduction of the various enzymic agents into the economy. This subject is of very great importance as regards the therapeutic use of the digestive ferments.

The writer dealt with this subject in a pamphlet on the "Extract of the Pancreas and its Uses," in 1883, and referred to his experiments

made with the gastric juice obtained by permanent fistula in a perfectly healthy dog, and the use of this fresh juice in digestion experiments upon foods in association with the pancreas ferments. Later, in his "Handbook of the Digestive Ferments," 1892, he especially called attention to the distinction between pharmaceutical compatibilities of the enzymes and their physiological relations and therapeutic adaptability.

In our review of this subject, we are struck with the fact, as in the history of all science, that there are periods of productiveness, of sterility, of reaction; that observations of the greatest importance and significance are unheeded or oftentimes directly denied, or become the subject of controversy when it would seem that they could have been corroborated by the simple repetition of the experiment; and thus we see the evolution of errors, and indeed the survival of error.

Investigators make correct and important observations on the special phenomena investigated, yet propound theories radically erroneous, not really deducible, and beyond the scope of the facts elicited. They come close to the heart of the matter, yet either discontinue, or, by faulty hypotheses, are diverted from the direction which should have led to great discoveries.

Errors concerning the nature, behavior, and relations of the enzymes have led to the preparation and employment of incompatible compounds, and have operated greatly to retard their utilization and the wide clinical investigation which would fully make known their therapeutic possibilities.

The early idea that pepsin should preferably be exhibited in small doses, the prevalence of mere saccharated attenuants of pepsin, led to a state of things which naturally was not favorable to any adequate development of its possibilities as a therapeutic agent.

As for "pancreatine," the erroneous impression early conceived (and perpetuated by constant repetition of the statement) that the pancreas ferments could only act in an alkaline media, bore a relation to alkalies analogous to that of pepsin to acid, has created a false presumption as to their therapeutic limitations.

In pharmacy we have yet to completely recognize that the enzymes have limitations and susceptibilities and compatibilities of a radically different nature to those of drugs and chemicals. For even at the present time we see that the enzymes are sometimes

destroyed when prepared with the best of purpose; and this in a way which does not at all exist as regards chemical preparations, simply from the universally recognized facts as to the compatibility and reactions of chemicals. It will be interesting to mention a few instances for their present practical importance:

It happened that Scheffer's interest in the subject was co-existent with the "elixir" mania, when the tendency was to produce as many combinations as possible, rather than to ascertain those most eligible for this form of exhibition. Naturally, pepsin and pancreatine did not escape.

Scheffer insisted on the incompatibility of bismuth in solution with pepsin. The writer has without success endeavored to prepare a solution which should retain pepsin in a vital form in contact with bismuth in solution for a sufficient length of time to justify its issuance as a pharmaceutical product. Compounds of pepsin and bismuth in solution are yet in commerce, and have a place in formularies.

That the ferments combined in solution are antagonistic to each other has often been pointed out. Scheffer early called attention to the incompatibility of pepsin and pancreatine, and pepsin and diastase in elixirs. It is impossible to prepare any media suitable for the preparation of the enzymes of the stomach and pancreas in combination in solution; for whether the reaction of the preparation be neutral, alkaline, or acid, there will be a gradual, sure, progressive deterioration of the product under the commercial conditions to which the preparation must be submitted. If the liquid preparation of the mixed peptic and pancreatic ferments be neutral or alkaline, the pepsin becomes destroyed; if acid, all but the pepsin perish, and the acid compound will therefore be found to be devoid of any pancreatic activity—capacity to convert starch, or to convert proteids in neutral or alkaline media.

On the other hand, it is a fact that suitable solutions of peptic and pancreatic ferments can be mixed extemporaneously and found to retain the virtues of the component ferments for a sufficient length of time for their use in the ordinary method of prescribing.

The rôle of hydrochloric acid, since Schwann's time (both its normal function and the limitations of its compatible percentage) has become thoroughly known; yet free mineral acids in destructive degree to the enzymes are often used in pharmaceutical prepara-

tions. And it has been even possible now for the assertion to receive publication that hydrochloric acid is the real digestant of albumen in the pepsin test.

Alcohol and glycerin in relation to the ferments are so important that they should receive attention.

In order to preserve the enzymes in solution, some antiseptic must be employed, and alcohol and glycerin prove the most desirable for pharmaceutical preparations of the enzymes, as they are in galenical preparations in general. The value of glycerin in the extraction and preservation of the enzymes is well known; we would say, however, that we cannot regard concentrated glycerin as being favorable for direct gland extraction; dilution with water is advantageous.

A great deal of misconception has existed regarding the relation of alcohol to the digestive ferments, especially as to the pharmaceutical and therapeutic significance of the facts, that strong alcohol precipitates pepsin; that pepsin does not digest well in the presence of diluted alcohol.

The writer, in his "Hand-Book of the Digestive Ferments," published in 1892, pointed out that alcohol retarded digestion *in vitro* simply for the reason that alcohol is not a media either for the activity of pepsin or for the solution of the products of digestion; that water is the physiological media in which the ferment performs its functions and by which the products of digestion are taken up as they are formed. And in his experiments with the influence of various agents upon digestion, he showed that glycerin, peptone, sugar, and other substances, likewise retarded digestion, not because they exerted in themselves any injurious influence whatever upon the ferments, but simply in the degree to which they diminished the proportion of water and its consequent capacity as a media.

The products of digestion all clog the action of the enzyme by which they are formed simply to the degree to which the media becomes saturated with them, not because they "paralyze" or injure the ferment. For upon the removal of these products by dialysis, and the addition of a fresh quantity of albumen, or by the addition of a fresh volume of the acidulated water and the addition of albumen, the ferment will exhibit its digestive action; and repeatedly, to such an extent that we do not really know the limits of its action—the life of the enzyme.

Alcohol in any percentage used in pharmaceutical and medicinal preparations is immediately diluted to a negligible quantity in the stomach in its relation to the enzyme in its ordinary exhibition; and in submitting alcohol preparations to the usual digestive test the alcohol forms so small a percentage of the digesting mass as to exert no retarding influence upon the action of the enzyme.

It was thought that because wines of pepsin were found by Squibb to be feeble or practically inert, their defect was necessarily due to the presence of alcohol; but this is not the fact.

In the first place, there was no certainty that the vinous or elixir preparations of pepsin had ever had any vital pepsin in them, or that the pepsin had not been injured by the acid in the preparation.

The conventional quantity of pepsin used in those days was a grain of the saccharated to one or two teaspoonfuls, so that a teaspoonful of such preparation could by assay digest only twelve to fifteen grains of albumen. Preparations containing sufficient alcohol and glycerin to ensure stability are readily made directly from the stomach, of which one teaspoonful upon U.S.P. assay will convert from 2,000 to 3,000 grains. There is an evident error in the attempt sometimes made to "assay" fluid preparations of pepsin containing alcohol by adding the coagulated albumen directly to the preparation. The question to be asked of an alcoholic preparation of pepsin is, whether it exhibits the action of pepsin when submitted to the proper (physiological) conditions—just as we assay the dry ferment, and thus only we determine its pepsin strength.

It was early observed that pepsin was destroyed by maceration with sodium carbonate and free alkali in minute percentages; pepsin has also been spoken of as being "altered" or "modified" by the action of an alkali.

Inasmuch as formulas have been suggested in which the neutralization of the acid pepsin infusion is directed, it is worth while to mention that pepsin is injured if the neutralization be carried to the very faintest alkalinity, and that this occurs instantly, and at ordinary temperatures; the pepsin cannot be considered "modified" or "altered" pepsin in any sense; it is simply annihilated; its activity cannot be restored by acidification or by any treatment.

In a word, it may be said that in determining the pharmaceutical possibilities of a preparation of the enzymes, the question is not

first (or necessarily at all) to be considered as to whether it is a "clear," visibly compatible preparation; its value can only be ascertained by submitting it to actual assay; that is to say, a fluid preparation must be tested by precisely the same means as the dry ferments. The preparation, then, should have such stability as to reasonably ensure its coming into medicinal or technical use in a proper form, assuming, always, that it will receive a proper degree of care in consideration of its organic nature; that it will not be exposed to heat, and that a proper rotation of supply will be observed.

The therapeutic use of the digestive enzymes in the peptonization of food is based upon purely physiological grounds, differing from ordinary alimentation only in the degree and extent to which the food is pre-fitted for assimilation when exhibited.

The chemico-physiological investigations as to the physiological reaction of the proteids, their cleavage products and derivatives, when introduced into the system otherwise than by the gastro-intestinal tract, interesting and practical as they are in advancing the domain of our knowledge, so far throw no light on the normal or abnormal processes in the body, and have presented no ground in the mind of any investigator, we believe, for any conclusions or theories, of significance in practical medicine. Especially unfounded, for instance, is any assumption that the more soluble proteids of digestion may be considered less valuable than the native or partially converted proteids.

We know well the composition and value of the native food, and the nature and object of the digestive conversion. Wide experience has well determined that a normal dietary must contain the varied elements of food, and in proper nutritive balance, and that the most minute elements thereof, even the inorganic, exert a marked influence upon the acceptability and digestibility of the foods with which they are associated.

The solution of food is essential to its availability for nutrition, and by means of the animal enzymes it became for the first time possible to prepare fluid food actually containing the entire digestible solid in solution in a non-coagulable form, thus utilizing in the feeding of the sick the normal typical foods, farinaceous and proteid.

The instinctive repugnance to solid food in disease has in itself led to the evolution of diet in therapeutics, and the peptonized foods

have naturally been a scientific and practical advance in contrast to the reliance upon fluids containing little or no solids, or solids in an indigestible form.

The disastrous effects in the past of delusive ideas as to what constituted food for the sick have been seen in the dependence so largely placed upon beef tea and extracts containing purely stimulating nitrogenous bodies. The effect produced upon animals in feeding them upon pure gelatin, or protein, or sugar, only confirms experience and reason as to the futility of such experiments in determining the value of foods, for if we were to measure the value of food elements by such results, we should logically have to conclude that no element is suitable for nutrition.

It is here interesting to mention that we are now obliged to qualify the view once so generally accepted as to the absolutely innutritive quality of gelatin. Recent physiological investigations go to show that gelatin in the ordinary diet exerts a marked influence in conserving and promoting the energy of other protein compounds, and probably in the building up or the replacing of the connective tissues analogous to gelatin.

At the outset of this paper the writer referred to the far-reaching scope of the subject. It will be seen that from whatever direction we approach the physiological and pharmacological investigations involved, we find matter of scientific and practical interest, and embodied in voluminous literature. Reference even to these researches has only been possible by restricting ourselves to those points of the greatest practical purport.

It is evident that we have arrived at a position where we can deal with the enzymes in pharmacy and medicine with as much practical certainty as with drugs and chemicals. It is true that we do not know what pepsin is; but if we ever succeed in isolating the enzymes, in order to prove for them a peculiar chemical constitution, it is not easy to see how we shall thereby make advance in pharmacy or medicine. Inasmuch as we do not know the chemical constitution of the enzymes; have no chemical tests or reagents to distinguish them as a group or as individuals, or, as it is often expressed, "we know the digestive ferments only by their action," this is often interpreted or stated from the viewpoint of presenting a distinct limitation and defect in our knowledge. But the physiological test quite transcends in delicacy the chemical, for it enables us to get the char-

acteristic action of the ferment from an amount so small as to quite elude and defy analysis. Just as in the anti-toxins, the characteristic effect is obtained from an amount so small as to even tax the imagination.

It may be said, also, that we do not know why sodium chloride exerts an unfavorable influence upon the proteolytic enzyme *in vitro*, but it positively does, even when present to the extent of 0.2 per cent. Likewise, we do not know why some of the extractive matters present in the pancreas secretions and in saliva (and in malt also) exert a profound influence upon the starch-covering ferment. We however know that inorganic salts in association with the ferments in normal juices exert a powerful action, and upon the separated enzymes themselves, and are in some way intimately related to their life and activity. We know how to extract the enzymes and preserve them, and how to apply them in many important directions; know their compatibilities and incompatibilities; and we are also able to distinguish differences between simple solutions of the ferments and the secretions of the glands themselves.

The limitations of our knowledge, whilst presenting most inviting subjects of inquiry, are mainly in their biological relations. The whole field of investigations in relation to the therapeutic utilization of the animal gland secretions is the object of active laboratory and clinical study, and we may naturally anticipate yet further additions to the brilliant achievements already made.

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## DOSE MEASURES AND MEASURED DOSES.

BY M. I. WILBERT.

While dose measures have necessarily been in use as long as doses of medicines have been given, little attention has been paid to their

accuracy, or to the accuracy of the doses measured. It is true that occasionally we find an article calling attention to the variation in the shape and size of the different household utensils that are used as dose measures. But, so far as the writer's knowledge goes, no attempt has ever been made to inquire into the needs and necessities for obtaining more accuracy in the administration of potent medicines to the patient.

Some remarks that were made at a recent pharmaceutical meeting led the writer to try and investigate more fully the existing dose measures as to their efficiency and accuracy, and to further make some investigations as to the importance of the part played by personal equation in the measuring of doses.

To confine ourselves within reasonable limits we will not go into a discussion on metrology, nor will we take up the measures for larger quantities, but will restrict ourselves to a consideration of the ways and means for measuring out spoonful doses of active medicines.

The difference in the size of various tea and tablespoons has been recognized for a long time. More than twenty-five years ago Mr. Barnard S. Proctor brought the matter up for discussion before the Pharmaceutical Society of Great Britain. In the course of this discussion several substitutes were suggested, Mr. Proctor himself championing a cheap graduate marked in quantities of drams and ounces, ignoring any and all reference to the term spoon. Others suggested graduated glass measures similar to those used so extensively at the present time.

Among the other devices for overcoming what was thought to be a serious problem was the graduating of the medicine vial into tea and tablespoon doses, so that the patient in pouring out the medicine could tell whether or not the proper quantity was being taken. This same device has since come into extensive use in connection with nursing-bottles. Here it answers a double purpose: facilitating the proper mixture of milk, cream and water, and at the same time aiding the mother or nurse to keep an accurate account of the amount of food consumed by the child.

Still another device was the use of a half-ounce bottle as a measure for tablespoonful quantities; this could be graduated for teaspoonful doses by making a scratch at the proper position with a new or sharp-edged file.

Of late years, the number and variety of graduated medicine measures has not only increased, but improvements in the methods of manufacture have materially reduced their price.

Among the first graduated medicine measures was a porcelain spoon graduated in quantities of tea, dessert and tablespoons. The one on the table is of English manufacture, and a fair sample of the way these lines, or graduations, are usually found.

The next step in the evolution of a cheap medicine measure was a molded tumbler with lines on the outside of the glass. As illustrated by the samples on the table, these measures were usually very crude and rather ungainly. A decided improvement, so far as accuracy in indicating the contents of these measures is concerned, was made when the lines were put on the inside of the glass. To do this it was of course necessary to engrave corresponding depressions in the plunger used for molding the glass. The resulting lines are never very heavy, and often become entirely obscured when we attempt to measure dark or viscid liquids.

Hand-graduated tumblers are not to be forgotten; but these, especially in the earlier days, were rather expensive and not within the reach of any but the more opulent. At the present time, probably the most popular variety of a cheap tumbler is a combination having the lines engraved on the outside of the glass, while the quantities are indicated by molded numbers.

Before passing to a critical examination of these various measures, let us revert a few moments to the subject of spoons as measures of capacity. A spoonful is defined in English dictionaries as being as much as a spoon will hold. This rather loose definition is accepted as authoritative, in so far, at least, that every one using a spoon for measuring is allowed to put his or her own construction on what is meant by it. The French Codex, so far as the writer's knowledge goes, is the only authoritative work that defines exactly what is intended by the term spoonful. This book says, "A spoon is full when the liquid is on a level with, but does not show a curve above the upper edge or rim of the bowl."

Using this definition as our guide, we have made a number of examinations of spoons as found in use at the present time. The results thus obtained have been grouped in Table No. 1.

TABLE NO. 1.—CAPACITY OF SPOONS, MEASURED ACCORDING TO DEFINITION OF FRENCH CODEX.

	Tea.	Dessert.	Table.
Tin . . . . .	4'6		14'5
Plated, No. 1 . . . . .	5'0		14'3
2 . . . . .	5'0	10'0	14'8
3 . . . . .	3'8	9'0	15'0
4 . . . . .	4'8	9'0	14'6
Silver, 1 . . . . .	4'9		15'
2 . . . . .	5'2	9'4	14'8
3 . . . . .	4'9	9'6	15'4

In this connection we might say that the figures given are the average results of ten spoonsful of alcohol, it having been found that the necessary conditions were more readily obtained with this liquid than with water.

An examination of the table will reveal the fact, that when measured according to the definition of the French Codex, spoons do not vary to any considerable degree in their capacity. They do, however, differ considerably from the generally accepted equivalents as popularly used in this country at the present time.

The results, on the other hand, concur, in the main, with the equivalents given by the writer in an article on "A Metric Medicine Glass," published in the AM. JOUR. OF PHAR. for November, 1901.

In this connection, the writer would like to call attention to the desirability of recognizing, in an official way, the fact that the capacities of spoons in use at the present time conform very closely to metric quantities. Another point that the writer should be pleased to see taken up for discussion, is the question of definite values for the various approximate measures in the metric system. This would appear to be a timely problem and one that should be decided in some official method. At the present time, if a physician writes a prescription in the metric system, and abbreviates his directions to "5 c.c. T. I. D.," the pharmacist almost invariably transcribes this as "One and one-third teaspoonful three times a day," much to the confusion of the patient and also to the chagrin of the physician, who accuses the druggist of being behind the times, and not understanding the system of weights and measures according to which he is supposed to prepare his preparations.

It is popularly supposed that the ideal dose measure is to be found only in the graduated medicine glass; so much so, that authoritative works on pharmacy and therapeutics unhesitatingly recommend the use of these measures where any degree of accuracy is to be desired. It has even been asserted that these measures are invariably accurate and could be relied on to deliver the exact quantities intended by the prescriber.

Let us take up first the matter of accuracy. The price at which these measures are usually sold would evidently preclude any argument that a reasonable amount of care had been expended in their manufacture, or, that they had been individually tested as to their actual capacity at various points.

Admitting this, it need not surprise us if we find that, at times, these measures are not even approximately correct.

One peculiar feature of the problem is the fact that the more expensive medicine glasses are much more likely to be wrong than

TABLE NO. 2.—CAPACITY OF MEDICINE GLASSES IN CUBIC CENTIMETRES.

Glass No.	Teaspoon.	Dessertspoon.	Tablespoon.	2 Tablespoons.
Normal . . . . .	3.7	7.4	14.8	29.6
1 . . . . .	3.0	5.2	12.2	27.5
2 . . . . .	6.4	8.8	16.4	33.5
3 . . . . .	4.8	8.4	14.8	31.0
4 . . . . .	3.5	7.0	14.2	29.5
5 . . . . .	5.6	7.0	14.6	30.0
6 . . . . .	3.2	7.2	14.8	32.
7 . . . . .	5.0	9.0	16.0	31.6
8 . . . . .	4.1	7.1	15.2	34.0
9 . . . . .	4.9	8.2	14.8	31.0
10 . . . . .	3.5	7.2	14.4	31.0
11 . . . . .	4.2	9.2	17.2	33.0
12 . . . . .	3.6	6.8	13.2	30.5
13 . . . . .	4.2	7.8	15.2	34.5
14 . . . . .	3.8	7.6	15.2	31.0
15 . . . . .	4.3	8.2	16.0	
Metric normal . . .	5.0	10.0	15.0	30.
16 . . . . .	4.1	8.2	16.0	33.6
17 . . . . .	4.9	10.3	15.2	30.
18 . . . . .	4.5	9.6	15.0	

are the cheaper variety that may usually be purchased for a mere trifle.

We have measured a number of these glasses and tabulated the results in Table No. 2. In explanation, the writer would like to say that with but few exceptions all of these glasses are samples obtained from manufacturers or dealers, and that the figures are, as in the case of the spoons, average results of ten or more measurements for each quantity, made as nearly as possible under the same physical conditions.

It will be noted that there is a marked difference in the quantities measured from the various measures, and that some of these glasses vary at different points. An attempt has been made to demonstrate the reasons for this, and at the same time to illustrate the difficulty most persons would have in attempting to measure small quantities from some of these graduated measures.

Table No. 3 gives the inner diameter of the various glasses at the

TABLE NO. 3.—GIVING DIAMETER OF MEDICINE GLASSES IN M.M.

Glass No.	Teaspoon.	Dessertspoon.	Tablespoon.	DISTANCE IN M.M. FROM	
				Bot'm to Table.	Tea to Table.
1 . . . . .	28'	30'	35'	13'5	11'
2 . . . . .	33'	34'	36'	18'5	11'
3 . . . . .	35'	35'5	37'5	15'	10'
4 . . . . .	34'	37'	40'	13'5	10'5
5 . . . . .	40'	40'5	42'	13'	9'
6 . . . . .	33'	34'	37'	14'	11'5
7 . . . . .	39'	40'	42'	14'	8'
8 . . . . .	35'	36'9	39'	16'	10'
9 . . . . .	31'	32'	34'	18'5	12'
10 . . . . .	27'	29'	31' 5	23'	16'5
11 . . . . .	27'5	30'	35'	29'	17'
12 . . . . .	27'	30'	34'	21'	15'
13 . . . . .	30'	32'	35'	22'	15'
14 . . . . .	29'5	32'	34'	21'	16'
15 . . . . .	26'	27'5	31'	26'	18'
16 . . . . .	29'	31'5	34'5	22'	16'
17 . . . . .	30'	32'	34'	21'5	14'
18 . . . . .	26'	28'	30'		

tea, dessert, and tablespoon mark, and also, as nearly as this is possible, gives the distance in millimetres, from the bottom of the glass to the tablespoon mark, and then the distance between the tea and tablespoon mark.

A description of the methods used for graduating these measures would not be out of place, and will serve to explain some of the variations in capacity.

For a cheap measure the lines blown or molded on the outside of the tumbler are the ones most readily available. These lines may be made quite heavy and distinct, but it will, necessarily, be very difficult, if not well-nigh impossible, to get two glasses exactly alike, on account of the variation in the amount of glass entering the mold and the consequent difference in their inner capacity. This type of glass is illustrated by numbers 10 and 11.

The next has the marks placed on the inside of the glass by a graduated plunger. If the plunger is accurately graduated this method will give quite uniform results for the same lot of glasses. Numbers 12, 13 and 16 are glasses of this variety, and illustrate the possible variation due to different plungers. These glasses also illustrate the fact mentioned a few moments ago, that these lines are sometimes very faint and easily obscured by a dark or viscid liquid. This is due to the fact that the plunger cannot be deeply engraved, as this would interfere with its consequent withdrawal from the finished glass.

Engraved glasses appear to be graduated according to one of the following methods:

Where a pressed glass is used for graduation, it is customary for some manufacturers to accurately measure and graduate one glass as a sample; from this they graduate a wood block, and this block is subsequently used as a pattern to graduate the remaining glasses made from this particular mold. Glasses graduated in this way seldom vary more than 10 per cent. The cause of variation is a slight difference in the internal diameter of the glass, or a slight elevation or depression of the bottom of the tumbler that prevents the gauge block from going to its proper position. Numbers 14, 15 and 17 are made according to this method, and are fair specimens of the results.

The next method, and the one that is used almost exclusively on the higher priced glasses, is to measure into a glass a certain quan-



tity of water, usually one tablespoonful. The glass is carefully marked at this point, then another tablespoonful of water is run in, and this point is also marked. This marked glass then goes to the engraver, who cuts the graduations in at the points that are marked, and then, either promiscuously or according to some fixed rule, the intervening space is marked off and graduated to represent the fractional parts of a tablespoonful. The glasses from 4 to 9 are examples of this style of measure and fairly represent the shortcomings of this method of graduating glasses. The third method of graduating plain glasses appears to be by the rule of thumb, and consists simply of putting on the outside of the glass the requisite markings according to some fixed scale or pattern. This style of graduation is always readily recognized, the lines are always in the same relative positions, regardless of any variation or difference in the shape, size, or thickness of the glass itself. Numbers 1 and 2 are samples of this style of graduations.

The variations that exist in some of the other medicine measures are shown in Table No. 4. Among these we have the porcelain

TABLE NO. 4.—CAPACITY OF OTHER MEDICINE MEASURES.

Porcelain graduated spoon . . . . .	3.5	7.2	14.2
Glass graduated spoon . . . . .	3.0	6.5	14.8
Glass medicine spoons . . . . .	4.0	6.0	16.0

medicine spoon, referred to before, as being a type of an early attempt to replace spoons by some more accurate means of measuring.

Recently a pressed glass graduated spoon has been put on the market. As a measure this has no advantages over the porcelain spoon just referred to, and it would appear to be of but slight use as a carrier or vehicle with which to administer doses.

Glass medicine spoons have been used to some extent, but these are to be classed among the most variable of all medicine measures.

A review of this portion of our investigations would appear to bring out the fact that these medicine measures vary as much as 70 per cent. at the teaspoonful mark; this graduation should really be the most accurate, as medicines that are given in teaspoonful quantities are necessarily more active than those given in larger amounts, so that a variation at the lower mark would appear to be of relatively more importance than the same variation at the graduations for larger quantities.

This actual variation in shape, size and capacity of medicine-glasses is but one side of the problem; another, and probably a much more important part, is played by the personal equation, or ability, of the person that is actually doing the measuring. This factor is usually lost sight of in discussions of this kind, but is really of considerable moment, especially when we consider that doses are necessarily measured by all classes and kinds of people that may, or may not, have had training in this particular direction.

To get some approximate ideas as to the real importance of this personal equation factor, we have made several hundred investigations or trials on, or with, upwards of a hundred people. Representative medicine measures were taken, and the various persons were requested to measure out ten doses, just as though they were to be given to a patient. For the liquid, a diluted alcohol, slightly colored with caramel, was used. An alcoholic mixture was chosen so as to reduce as much as possible the error resulting from portions of the liquid remaining adherent to the sides of the glass. The doses were measured into a beaker or glass tumbler so as to avoid any suggestion that might be offered by the lines and figures on the sides of a graduate. The total quantity was later measured, and this total, divided by ten, gave us the average for the individual doses. By measuring twenty doses alternately, in two separate tumblers, it was found that the averages were remarkably even, so that for all

TABLE NO. 5.—SHOWING HIGHEST, LOWEST AND AVERAGE QUANTITIES MEASURED FROM THE SAME MEASURE BY VARIOUS PERSONS.

TEASPOONS.			Glass No.	TABLESPOONS.		
High.	Low.	Average.		High.	Low.	Average.
3'6	1'5	2'5	4	15'2	11'6	14'4
3'4	2'1	3'0	5	14'5	10'8	12'8
3'5	1'8	2'6	6	13'8	11'5	12'6
4'9	3'0	3'9	13	16'6	12'0	14'2
5'2	3'1	3'8	14	16'6	12'0	15'0
4'4	3'5	4'1	15	16'2	14'0	14'8
6'0	3'2	4'4	17	16'2	12'3	14'9
7'0	3'0	5'0	Spoon.	18'0	8'9	14'0
4'2	2'0	3'2	Med. spoon.	16'4	12'2	14'2
5'1	4'5	4'8	Special.	15'2	14'6	14'9

practical purposes there was no decided element of error to be taken into consideration.

Table No. 5 shows some of the results, and illustrates the highest and lowest dose averages obtained from several of the medicine measures used. When we compare the results given here with the diameter of the glasses as given in Table No. 3, we learn that the cheapest available medicine-glass may be considered the most accurate for all around use. This is due to the fact that the manufacturer, in the first place, graduates these measures nearly correct; and, secondly, that in the subsequent use for measuring, a slight variation of the resulting meniscus above or below the line is of comparatively little moment. With wide glasses, on the other hand, a slight variation of the engraved line, by the maker, or a corresponding variation of the meniscus of the liquid being measured, makes a decided difference in the amount of liquid actually measured.

Here again we may note that the variations at the teaspoonful quantities are comparatively much greater than at the tablespoon.

Altogether these tables would appear to contain much food for thought, and in a general way indicate the lines on which a more accurate and reliable medicine measure might be made.

Another series of experiments, made with a view of obtaining some data as to the value of experience in measuring doses, are shown in Table No. 6. These experiments were again made with tea and tablespoonful doses, and the tables give the highest, lowest and average quantities measured by respectively ten patients, ten nurses, and ten physicians.

As was to be expected, the greatest amount of variation occurred, of course, in the use of the spoon; this is accounted for by the fact that there is a decided difference of opinion as to what constitutes a spoonful, some people considering a spoon full when it is filled to a point where it would become difficult to carry it about without spilling some of its contents. Others, on the other hand, appear to contend that a spoon is not full "Until it doth run over;" it is easily seen, therefore, how in the one case we may have as the result more than double what we had in the other.

Pretty much the same thing occurs, however, with a medicine-glass; very few people, unless previously instructed, have any idea how to measure with a graduated measure, the great majority reading from the upper edge of the resulting meniscus, so that under

TABLE NO. 6.—SHOWING HIGHEST, LOWEST AND AVERAGE QUANTITIES MEASURED FROM THE SAME MEASURE BY, RESPECTIVELY, TEN PATIENTS, TEN NURSES, AND TEN PHYSICIANS.

TEASPOONS.			Patients.	TABLESPOONS.		
High.	Low.	Average.		High.	Low.	Average.
7'0	3'0	5'2	Spoon.	18'0	8'9	13'5
5'2	3'2	3'8	Glass No. 14.	16'2	12'0	14'2
6'0	3'4	4'4	Glass No. 17.	15'6	12'3	14'4
High.	Low.	Average.	Nurses.	High.	Low.	Average.
6'7	3'6	4'6	Spoon.	16'2	12'6	13'9
4'4	3'5	3'8	Glass No. 14.	16'4	13'0	14'9
5'2	3'2	4'6	Glass No. 17.	15'0	13'2	14'5
High.	Low.	Average.	Physicians.	High.	Low.	Average.
5'8	3'8	4'9	Spoon.	15'6	12'0	14'4
4'8	3'1	3'9	Glass No. 14.	16'6	14'8	15'7
6'0	3'6	4'8	Glass No. 17.	16'2	13'8	14'9

certain conditions a patient may, at one time, get more than double the dose of an active medicine than he has been in the habit of having. Altogether, the possible results from variations of this kind are not in keeping with modern ideas of scientific medicine. Several other interesting features were developed in the course of these investigations: one of them is the fact that the majority of people measure out larger doses from a small bottle than they do from one three or four times the size. Using the same liquid and the same measure, the variation in the size of the doses measured reached as much as 20 per cent. The reason for this particular difference was not developed, but it was probably due to some suggestive influences.

Another interesting variation was noted in connection with spoons. It appears that individuals using the same spoon almost invariably measure out more when using a colorless fluid than when using one that has a decided color. In some cases this difference has reached as much as 70 per cent. This variation was found to be more marked in artificial light. This latter incident probably gives the clue for a solution of this particular problem. The direct cause for

the variation probably being the fact that a colorless fluid is not so readily seen against a bright shining spoon as is one that has considerable color.

Suggestion is a factor that plays an important part in experiments of this kind, and at times, at least, is very difficult to guard against. Just one case to show how easy it is to influence even most intelligent people :

A particularly careful physician was asked to measure out doses with the various measures, and after obtaining several averages it was suggested that he try measuring teaspoonsful of a colorless fluid just to notice the difference in the size of the doses. His averages in this case were slightly below his corresponding averages for the colored liquid. When told that his results in this particular test varied considerably from those obtained by others, he volunteered to try again, and despite the fact that he asserted the quantities to be no larger than before, his averages in this case were nearly one-fourth greater.

There is one other feature of the personal-equation factor that might be mentioned in this connection; this is the variation that occurs in measuring doses of medicines that contain opiates. It is not an uncommon occurrence to have customers who have this class of prescriptions refilled at gradually shortening intervals. This would indicate one of two things : either the patient was taking more doses than the physician prescribed, or his dose-measures were gradually becoming larger; at any rate, it is one of the many possible abuses that should be guarded against by the pharmacist.

Having enumerated a few of the possible sources of error in measuring doses, the question naturally arises, Is there any possible remedy to correct these various discrepancies?

The solution of the problem that suggested itself to the writer's mind is a rather tall and narrow measuring-glass, on which the teaspoonful quantity is correctly indicated. With such a medicine measure there would be but slight chance of any grave or glaring error, either in its manufacture or its subsequent use.

The subject of drops and droppers was taken up later, with a view of determining what, if any, difference existed between the drops from various shapes and sizes of so-called medicine-droppers. This simple device is now in such general use in this country, and the number of very active drugs that are measured out in drop

doses is increasing to such an extent, that an inquiry into the possible variation in the size of the drops was thought to be of considerable and timely interest, especially in view of the fact that the Pharmacopœial Revision Committee has before it a proposition to adopt an official or standard dropper.

The literature on the subject of drops is quite extensive. The files of the AMERICAN JOURNAL OF PHARMACY alone contain numerous and exhaustive papers on this subject, and many, if not all, textbooks and commentaries have considerable amount of space devoted to a more or less exhaustive review of the subject, and also the more or less reliable tables of the number of drops of various liquids that are necessary to measure a fluid dram. Many, if not all of the investigations that are usually quoted, were carried out by dropping either from the lip of a bottle, the edge of a cork, or the lip of a minim graduate. As far as the writer's knowledge goes, no extensive investigations have been made into the subject of drops from the much-used medicine-dropper.

In dropping liquids from a pipette it is essential that the latter be held point down, if correlating results are to be obtained. In actual practice this necessary precaution does not appear to be recognized or appreciated. In some experiments that were made to determine what, if any, effect personal equation would have on the number of drops necessary to weigh one gramme, it was noted that comparatively few people held the dropper point down, but that the majority held the pipette at such an angle that the drop was formed from the side rather than the point of the dropper. That a difference in the way a pipette is held has a most decided effect on the size of the resulting drop is well illustrated in Table No. 7.

Few people would admit that there could be such a variation in the size of drops from the same dropper, but a series of experiments, that any one can conduct for himself, will be the best way of convincing them of this fact. One question naturally arises: What dependence can be placed in the extensive drop-tables usually published in works of reference? Here, again, the answer must be with the individual, and the only suggestion that the writer wishes to offer is, that it may at times be well for the individual to try and duplicate some of the quantities stated according to his own methods or ideas.

TABLE NO. 7.—SHOWING NUMBER OF DROPS REQUIRED TO WEIGH 1 GRAMME.

		DIST'D WATER.				DIL'D ALCOHOL.			ALCOHOL.	
		Diameter.	Normal.	High.	Low.	High.	Low.	High.	Low.	Low.
Straight . . . . .	3 m.m.	20	26	13	50	20	68	45		
Ground . . . . .	3 m.m.	20	25	18	54	42	73	52		
Short taper . . . . .	3 m.m.	20	20	10	44	26	54	33		
Bent . . . . .	2 m.m.	28	32	10	70	30	90	35		
Exact . . . . .	3 m.m.	20	22	10	48	26	65	56		
French . . . . .	7 m.m.	10	14	10	40	24	47	29		
Large bulb . . . . .	18 m.m.	8	9	8	22	20	28	26		
Decigramme . . . . .	0 m.m.	10	10'5	9'5	28	25	36	33		
Dropping bottle . . . .		10	12	10	33	29	36	32		

One thought that was suggested by the results obtained was, that a drop of water, weighing the one-tenth part of a gramme, was a relatively more constant quantity, and one that could be more easily duplicated, than the proposed standard drop weighing the one-twentieth part of a gramme. This proposed standard drop is rather difficult to obtain without considerable variation or error. One improvement in the pipette, as proposed by Dr. Seaman to the Pharmacopœial Revision Committee, suggested itself. This is, to grind the lower edge or mouth of the pipette; this appears to retard the crawling up of the liquid and the consequent increase in the dropping surface. But even with this modification, we still have a possible variation of more than 30 per cent.

If we modify the "French pipette" in the same way, we can reduce the variation to less than 20 per cent.; and in addition to this we would practically establish the proposition that a drop of distilled water is a metric quantity, being equal in weight to one decigramme, or in bulk to the one-tenth part of a cubic centimetre.

It is possible, however, to bring the drop of distilled water still nearer to a fixed metric standard. If we had a perfectly round sphere, of from 7 to 9 m.m. in diameter, arranged so as to allow drops of water to form and drop from it, we would find that these drops were so regular in size and weight that they might be used as a standard of weight and bulk. To all intents and purposes this would at least equal in accuracy the plump grain of wheat that is the standard of weight for the various systems at the present time.

As such a sphere is not readily adapted to be used as a dropping pipette, the writer has devised a simple spherical outlet to an ordinary pipette, and with a dropper constructed on this principle it is possible to drop, either from the sides, bottom or edge of the tube, drops that will weigh, within a minute fraction, one decigramme. So constant are these drops as to weight and size that 10 will weigh one gramme, and 100 will weigh 10 grammes or measure 10 c.c., with a possible variation of less than 5 per cent.

From a series of experiments that have been made, it may be said that this ratio is fairly constant, for all aqueous liquids or solutions, as to weight but not measure. The relative number of drops of alcohol may be said to be three to one of water, and of dilute alcohol about two and a half to one of water. This latter proportion is perhaps a little high, and for all practical purposes the following ratio may be taken as representing a fair average: Water, 1; diluted alcohol, 2; alcohol, 3.

In conclusion, the writer would suggest that a perfectly made decigramme pipette may simplify the relative size and weights of drops, and would also offer an additional argument for the introduction and use of the metric system of weights and measures.

## A METHOD OF DETERMINING THE SOLUBILITY OF ALKALOIDS.

BY ROBERT A. HATCHER, M.D.

In attempting to dissolve cinchonine in water much difficulty was experienced, owing to the fact that the powder floated upon the surface of the liquid or clung to the sides of the vessel.

The alkaloid was then dissolved in alcohol and added to water, the alcohol being expelled by heat; but this method proved no more satisfactory than the first mentioned.

The cinchonine was next rubbed with water until a smooth mixture was made; to this was added from a burette the requisite amount of  $\frac{N}{10}$   $H_2SO_4$  to convert it into the sulphate, and solution easily effected. Portions of this were diluted in various proportions, and to each a slight excess (about 2 c.c.) of  $\frac{N}{10}$  NaOH added; from the relative amounts precipitated in the various dilutions an



estimate of the amount remaining in solution was gained, and a new series of dilutions made and precipitated as in the foregoing. That solution which gives a barely perceptible precipitate, using a control solution for comparison, is taken as the solubility, or this dilution and the lowest giving no perceptible precipitate are taken and the solubility is reckoned as the mean of the two. Applying this method to morphine, it gave results agreeing with the solubility given by the Pharmacopœia.

I therefore suggest the following method of finding the solubility of those alkaloids which do not readily dissolve in water :

Take 0.1 gramme of the substance, rub with water to a smooth paste and then with water until a smooth mixture of about 9 c.c. is obtained, to this add enough N  $\text{H}_2\text{SO}_4$  from a burette to convert the alkaloid into the sulphate, and then enough water to make 10 c.c. of solution ; of this take portions of 1 c.c. each and dilute in several proportions ; to each add a slight excess of N NaOH, and from the relative amounts of precipitate estimate the solubility ; again, take several portions of 1 c.c. each and dilute to approximately the point of saturation, in one case using higher and in another lower dilutions ; again, precipitate with slight excess of NaOH, and more accurately estimate the solubility. From a third series, using the second estimate as a basis, the solubility may be learned by taking the mean of the highest giving a precipitate and the lowest giving none that is perceptible.

I would also suggest the application of this method for testing those alkaloids, the solubility of which is known. Thus, morphine is soluble in 4350 parts of water ; and if 0.1 gramme morphine be rubbed with water and then with enough N  $\text{H}_2\text{SO}_4$  to convert it into the sulphate and diluted to 10 c.c., and two portions of 1 c.c. each of this be further diluted to 43 c.c. and 44 c.c., including the requisite amount of N NaOH to give a very slight alkalinity, a slight turbidity or precipitate should be found in the first and none in the second, from which is taken the mean, or 1 part in 4350, as the solubility of morphine. Of course, in the case of expensive alkaloids, 0.01 gramme may be used instead of 0.1 gramme, but more accurate results will be had by using the larger quantity.

## THE SOLUBILITY OF CINCHONINE.

BY ROBERT A. HATCHER, M.D.

Being requested to examine a specimen of cinchonine from a reputable manufacturer (Schuchardt), which was sold as pure, the pharmacopœial tests were applied, including those for the detection of other cinchona alkaloids, melting point, solubility in alcohol, ether and water. It conformed to every requirement save that of solubility in water.

The Pharmacopœia states that cinchonine is soluble in 3,760 parts of water. Roscoe and Schorlemmer quote Hesse, giving the solubility as 1 to 3,670 at 20°, 1 to 2,500 at the boiling point. I regret that, I have not access to the original paper, as there is evidently a typographical error in one of these, transposing the 6 and 7.

The difficulty experienced in effecting solution led to the device which is the subject of the preceding article. Prolonged boiling in 15,000 parts of water proved ineffectual, none seeming to have dissolved. Having added an alcoholic solution to water, the amounts precipitated from dilutions of 1-10,000 and 1-20,000, while none precipitated from the 1-25,000, furnished an approximate idea of the solubility.

The method just described was used, 0.1 gramme being dissolved in 90 c.c. of water with the aid of  $\frac{N}{10}$  H<sub>2</sub>SO<sub>4</sub>, and enough water added to make the volume up to 100 c.c. Several portions of 10 c.c. each of this solution were diluted to 150 c.c., 200 c.c. and 250 c.c., respectively, making dilutions of 1-15,000, 1-20,000 and 1-25,000. To each of these was added a slight excess of  $\frac{N}{10}$  NaOH; the weakest solution showed no precipitate, the next showed some, and the strongest considerable. The solubility evidently lay between 1-20,000 and 1-25,000. The process was now repeated, using 10 c.c. and diluting to 1-20,000, 1-22,000 and 1-24,000. Upon adding a slight excess of  $\frac{N}{10}$  NaOH to each, and cooling to 21° C. for about 12 hours, a slight precipitate was observable in the dilution of 1-22,000, but none in that of 1-24,000. The mean was taken as the approximate solubility of cinchonine—1-23,000—and this is as near the exact figure as can be attained by ordinary procedures,

the nature of cinchonine and the presence of certain insoluble particles which pass through the filter serving to obscure the more exact results.

Upon adding the exact equivalent of  $\frac{N}{10}$  NaOH for the  $H_2SO_4$  employed, no precipitation occurred even upon cooling stronger solutions to  $20^\circ$  for 24 hours, hence the slight excess of alkali was employed.

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## A TRUE BENEFACTOR.

BY WILLIAM B. THOMPSON.

The announcement of the death of Prof. Emil Scheffer, of Louisville, Ky., at the honorable and unusual age of 90 years—almost patriarchal in duration—recalls to the recollection some interesting facts. It is now thirty years since Professor Scheffer generously gave to scientific knowledge the result of his studies, and the exact determination of the nature and physical character of that chief factor of peptic-ferment, pepsin. Previous to Professor Scheffer's successful and valuable labor no distinctive isolation of pepsin, as a substance, had been made. French scientists had recognized the fact that there existed a normal agent in the gastric and digestive fluid of the stomach, and had even traced its origin to a secretion from the mucous folds of that organ and of the intestinal tract. There was a theory that it was only in the living organism that this peculiar and potent agent exercised its action, and that with the cessation of vitality it at once became inert. Thus it was that the separation, or elimination, if attempted at all, was merely a mechanical process, accomplished by scraping the separable mucus from the walls of the stomach of mammals. Therefore, the pepsins of the then almost wholly foreign commerce consisted of mucus artificially and imperfectly dried with, possibly, some semi-converted food, as peptone, and an absorbent medium, such as starch, with the addition of a proportion of lactic acid to complete the imaginary character. From this it will readily be observed that there was nothing whatever of definite existence or proportion; and whilst such substance found its way into medical adoption, and useful results were thought to be traceable to it, it could not be considered other than a crude and unsatisfactory product. The older pharma-

cists will well remember the intractable character of the American imitations of that former day and the vexatious attempts to bring it into pulverized accord with accompanying components of prescriptions. With the successful completion of Professor Scheffer's labors and determining experiments, he gave to the world, in pamphlet form, a clear and comprehensive résumé of all the various steps of process of preparation, a minute description of the properties of pepsin, its behavior to other substances, its assimilation, and its antagonistic associations. For this most unselfish, generous, and liberal spirit the victims of pain and suffering everywhere, the votaries of science, the medical profession, and the exponents of pharmaceutical research have incurred a debt of unrequitable gratitude, and owe that fullest meed of honor and praise that is ever the tribute of sincere appreciation. By this act Professor Scheffer bestowed upon commercial enterprise, without reward, an article of manufacture, which not only amply enriched those who appropriated it, but which added wealth to the material productions of our country. Alas! there are but few to be found now of that nobler mold of mind and spirit which actuated this man. The demon of individual grasp and greed, the clutch for self-gain, now suppress all higher instinct, and make of the discoverable benefactions to mankind a secret of trade, to be accorded to general use only when some selfish desire for pecuniary benefit is amply recompensed.

Professor Scheffer labored in the ranks of pharmacy, with which pursuit he was immediately identified. Let the honor due his labors be felt and appreciated by his confrères, and let his name be enrolled on the scroll of benefactors of mankind.

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## SOME RECENT DRUG ADULTERATIONS.

BY LYMAN F. KEBLER.

According to the First Annual Report of the New York State Board of Pharmacy to the Governor, 3,390 medicinal remedies were examined, and of this number 2,637 were adulterated, or not up to the required standard. These drugs were purchased from all sections of New York State—Eastern, Middle and Western—and that over 77 per cent of such a collection should be of inferior quality is hardly creditable. The writer has kept watch of the wholesale trade in Philadelphia for the past six months, and finds that his

former statement relative to the percentage (less than 5 per cent.) of adulterations met with well covers this point.

The following interesting adulterations have been met with by the writer and other workers in various sections of the world :

#### ARTIFICIAL CINNAMON BARK.

Guava (Jungle Bark) can be placed on the Columbo market at a very reasonable price. This bark resembles cinnamon bark very closely, and, consequently, certain unprincipled individuals have taken this bark, scented it with oil of cinnamon, or the by-products in the distillation of the cinnamon oils, and offered it as cinnamon bark. A superficial examination of this bark would not reveal its identity.—*Pharm. Centralblatt*, 42, 526.

#### CROTON OIL IN TINCTURE OF IODINE.

It has been reported that the above oil has been found in tincture of iodine. (Tincture of iodine and croton oil resemble each other in that they are irritants to the skin, but here their similarity ends. No one would ever think of applying croton oil where iodine was indicated. Whether the above adulteration is an ingenious one from the druggist's point of view is questionable. The object, of course, was to make the tincture more efficient by using a small quantity of croton oil. When it is remembered that croton oil will take up, at least, 100 per cent. of iodine, and thus tend to make the tincture of a lighter color, and at the same time it is questionable whether the hypothetical "Crotonoleic Acid" will retain its normal irritating properties when combined with iodine, such an admixture would, on general principles, be considered very injurious. L. F. K.) —*Brit. and Colonial Drug.*, 40, 176.

#### A NEW ADULTERATION OF BERGAMOT.

Dr. Salvatore Gulli (*Chemist and Druggist*, 59, 699) notes that the commercial adulteration of oil of bergamot, by means of either the crude or other inferior bergamot distillates, or by isomeric peel essences, has almost ceased, because the normal physical properties are usually abnormally distributed by such addition. New falsifications are, however, making their appearance. One of the ingredients chiefly distributed is the per cent. of linalyl acetate, which it is the desire of the manipulator to be

as high as possible, because this is frequently the basis of a purchase. With this object in view, he diligently seeks to add some material which will bring up the ester content of an inferior oil. This he has found in bi-hydrochloride of terebinthin, or other products resulting by the action of hydrochloric acid gas on turpentine. These chloro-derivatives are decomposed when submitted to the usual alcoholic potash saponification process, and consequently the apparent quantity of ester is increased.

From 5 to 10 per cent. of these chloro compounds when added to oil of bergamot are sufficient to raise the indicated per cent. of linalyl acetate without materially disturbing the normal properties of the oil, as is clearly shown by the examination of a number of commercial samples of oil of bergamot which contained the above chloronated turpentine compound.

No.	Specific Gravity at 15° C.	Opt. Rot. at 20° C. in a 2 cm. tube.	Per Cent. of Ester.
1 . . . . .	0.882	+ 10.5°	36.05
2 . . . . .	0.8817	+ 8°	36.75
3 . . . . .	0.8810	+ 6°	36.40

It will seen from the above figures that these oils are normal in every respect; nevertheless, they were all adulterated with from 5 to 10 per cent. of this artificial chlorine product. The presence of this impurity is not very easy to detect, and the above writer recommends the following process: Boil several grammes of the suspected oil with alcoholic potash, evaporate gradually, and then calcine so as to get rid of the organic matter; treat the resulting residue with distilled water, filter and test the filtrate for chlorides in the usual way.

#### HONEY ADULTERATED WITH SUCROSE.

Recently a sample of honey was examined by the writer with the following results: Specific gravity at 15° C., 1.354, acid reaction; pollen grains, none; moisture, 24½ per cent.; ash, 0.21 per cent.; optical rotation, direct, + 9½ divisions sugar scale, at 25° C.; optical rotation after inversion, — 11.6 divisions on the sugar scale, at 25° C.; reducing sugar direct, 54 per cent.; reducing sugar after inversion, 63.50 per cent.

The above figures all indicate the presence of added cane sugar. The dextro-rotatory power of the honey was apparently ample to decide that it contained cane sugar, because, as yet, we have no

genuine honey of this country reported as being dextro-rotatory, and until such an authentic observation is made, which is possible, a dextro-rotatory honey must be looked upon with suspicion.

#### THE ADULTERATION OF ERGOT OF RYE.

*The Paint, Oil and Drug Reporter* contains a letter which informs us that ordinary rye ergot is being at present largely adulterated with ergot of wheat and barley to the extent of from 30 to 40 per cent. If this condition of affairs exists, it certainly is very unfortunate, because very few manufacturers in this country are in position to detect such adulteration. While it is generally known that rye ergot contains more or less of the wheat ergot, it is generally believed by those in a position to know that this practice does not exist to the extent of 30 to 40 per cent. In the first place, ergot of wheat is comparatively a scarce article. It might also be mentioned in this connection that various authorities who have examined these ergots find that the wheat ergot is probably as efficient as rye ergot. In fact, the wheat ergot seems to retain its active properties longer than the rye ergot.

#### VANILLA BEAN, ADULTERATED.

Henri Lecomte (*Bull. des. Sc. Pharmacolog.*, 1901) notes that the presence or absence of a crystalline coating on the vanilla bean is no indication of its quality. According to this author, the Mexican vanilla beans, which are classed among the best, are always without these crystals. He further states that the crystalline appearance is frequently an artificial covering produced by the addition of benzoic acid. This adulteration can easily be detected by determining the melting point of the crystalline coat. The character of the crystals can be detected by dissolving a trace of phloroglucin in alcohol on a watch-glass, adding an equal volume of hydrochloric acid; then introducing, by means of a slender glass rod, one or more of the minute crystals from the vanilla pod into the mixture, and a beautiful red color will be produced, if it is vanillin, whereas benzoic acid crystals will leave the mixture colorless.

#### IMITATION PEPPER.

Artificial pepper has been found in the Switzerland market. These artificial pepper corns are slightly smaller than the genuine berries,

and somewhat heavier than water. In water they quickly disintegrate, dissolving in part; the remaining portion subsides in the form of powder. One variety consisted, for the most part, of starch mixed with soluble binding material. Another variety appeared to come from an olive-oil industry, where the residue, which appears in commerce as "sansa," was utilized. The surface of the black berries was covered by means of sand-colored black. Both varieties manifest a burning taste, which was due to the admixture of a little paprika.—*Schweiz. Wochenschr. f. Chem. u. Pharm.*, 39, 1901.

## BEESWAX.

As usual, beeswax has contributed its quota of samples, more or less adulterated, as the following results will show:

Kind.	Melting Point.	Specific Gravity at 15° C.	Acid No.	Ether No.
White . . .	64° C.	0.926	6.2	66.6
Yellow . . .	64° C.	0.938	12.9	60.9
Yellow . . .	55° C.	0.9138	10.9	22.6

The above data clearly indicate that the samples examined were liberally adulterated with ceresin, although this is not the only adulterant added, as is clearly seen by the ratio that exists between the acid and the ether numbers. Tallow or a similar substance, which will bring up the ether number and not the acid number, is manifestly indicated by some of the above figures.

## OIL OF WORMWOOD.

Quite a considerable quantity of this oil has been found adulterated, the usual diluent being turpentine. The following results were obtained while making an examination of a number of samples submitted:

No.	Specific Gravity at 15° C.	Solution in 2 Vols. 80 Per Cent. Alcohol.	Solution of 1st 10 Per Cent. of Distillate in 2 Vols. of 80 Per Cent. Alcohol.
1 . . . . .	0.9128	insoluble.	insoluble.
2 . . . . .	0.9104	"	"
3 . . . . .	0.9362	soluble.	soluble.
4 . . . . .	0.9071	insoluble.	insoluble.
5 . . . . .	0.9262	soluble.	soluble in 2-3 vol.
6 . . . . .	0.9299	"	—
7 . . . . .	0.9364	"	soluble.
8 . . . . .	0.9112	insoluble.	insoluble.

The normal properties of oil of wormwood are: a somewhat viscid liquid of a dark-green color, odor unpleasant and taste somewhat



bitter and persistent. Specific gravity, 0.925-0.955. On account of its dark color it is difficult to determine the optical rotation generally. The oil itself is soluble to a clear solution in from two to four volumes of 80 per cent. alcohol. On submitting the oil to fractional distillation the first 10 per cent. of the distillate is soluble in two volumes of 80 per cent. alcohol. From the above data it can readily be seen that numbers 1, 2, 4 and 8 are deficient in a number of points, and careful investigation showed that these oils were liberally adulterated with oil of turpentine. The turpentine odor was even perceptible to the nose in several samples.

LABORATORY OF SMITH, KLINE & FRENCH CO.  
 PHILADELPHIA.

## RECENT LITERATURE RELATING TO PHARMACY.

### ESTIMATION OF PHENOLS, WITH SPECIAL REFERENCE TO OIL OF CLOVES.

Verley and Bolsing publish a paper (*Berichte*, 1901, 3354) on the determination of alcohols and phenols, especially in essential oils, by a method they have elaborated. In a second paper they deal with the special applicability of the process to oil of cloves for the determination of the eugenol. The principle of the process is the esterification of the alcohol of phenol with acetic anhydride, with the addition of pyridine, which serves to retain the acetic acid formed during the esterification, thus preventing the reverse process of hydrolysis going on. The actual details of the process are as follows:—

One hundred and twenty grammes of acetic anhydride and 880 grammes of pyridine are mixed, care being taken that no traces of water are present. No reaction takes place, but on the addition of water the anhydride is decomposed with the formation of pyridine acetate, which is easily saponified by alkali. The acetic value can thus be obtained for the mixtures. From 1 to 2 grammes of the substance to be examined is introduced into a flask holding about 200 c.c., and 25 c.c. of the mixture of acetic anhydride and pyridine is added. It is then heated for fifteen minutes on a water-bath without a condenser, which appears to be unnecessary, and after cooling 25 c.c. of water is added, and the free acetic acid titrated with potash, using phenolphthalein as indicator.

A number of results are given, some being of almost theoretical

accuracy, and some are very much lower than they should be. Whilst correct results may follow in some cases, careful investigation is needed before the process can be said to be as accurate as the well-known acetylation method. This is well emphasized in the case of sandal oil and santalol. It is established that no pure sandal oil yields less than about 90 per cent. of santalol, and that pure santalol yields results agreeing with over 100 per cent., rather than under; but the new process gives only 81 per cent. for the oil, and 95 per cent. for the pure alcohol.

The second of the papers deals with Umney's and Thoms's processes for the determination of eugenol in oil of cloves. It is pointed out (as is well known) that the use of 10-per-cent. alkali causes some of the non-phenolic constituents of the oil to be absorbed, but that better results are obtained by the use of 3 to 4 per cent. alkali. Indeed, oils prepared by mixing known quantities of eugenol and terpenes gave results within 1 to 2 per cent., and very reliable results may usually be obtained by the absorption-process with dilute alkali. Three samples were prepared from pure eugenol and pure sesquiterpenes of 85 per cent., 90 per cent., and 95 per cent. strength. The three results in each case are as follows:

	Per cent.	Per cent.	Per cent.
Actual eugenol value . . . . .	85.0	90.0	95.0
Acetic pyridine method . . . . .	84.4	89.5	95.9
Absorption process (dilute) . . . . .	85.3	90.0	95.0
Thoms's process . . . . .	81.5	87.2	91.4

Two samples of normal clove oil also gave results in which the absorption and the esterification processes were in accord. Two other samples which were examined showed results in which Thoms's process was in very good agreement with the acetic-pyridine method; whilst Umney's process gave far too high figures—as much as 95 per cent., against 80 per cent. by the other two processes. The figures appear to us most unsatisfactory and unconvincing; but the authors sum up their conclusions as follows:—(1) The esterification-process with acetic anhydride and pyridine serves to determine the eugenol in oil of cloves so long as no other phenol or alcohol is assumed to be present. (2) Umney's method can lead to most erratic conclusions, except when the clove oil is one whose physical characters are quite normal throughout. (3) Thoms's process gives too low results when the oil contains a high amount of nonphenolic constituents.—*Chemist and Druggist*, Dec., 1901, p. 1053.

EXAMINATION OF THE ALBUMINOUS CONSTITUENTS IN URINE.

In a paper in the *Pharmaceutische Post* (1901, p. 753) is given a scheme by Portes and Desmoulières for the examination of the albuminous constituents in urine, as follows:

Thirty c.c. of well-filtered<sup>1</sup> urine is acidified by adding a few drops of concentrated acetic acid (3 to 4 drops); shake well and allow to stand.

A. Sediment.<sup>2</sup>

a. Soluble in conc. acetic acid (Nucleoalbumin).

Control reaction: Urine + 3 volumes of water is divided into two test-tubes, one of which may serve as a comparison. The one tube upon being acidified with acetic acid becomes perceptibly cloudy, due to a precipitation of the pseudo-mucins.

If a copious precipitate appears it must be collected, washed and dissolved in weak sodium hydrate solution, from which it is again precipitated by adding a saturated solution of magnesium sulphate. In this last precipitate phosphorus will be looked for after calcining with potassium nitrate and soda (by the aid of the nitro-molybdate reaction).

b. Insoluble in concentrated acetic acid (Mucin<sup>3</sup>).

Control reaction: Hydrochloric acid and nitric acid added in small amount precipitates the mucin, which is soluble in an excess of acid solution. Monosodium phosphate also accomplishes the same end. Mucin contains no phosphorus.

B. The solution<sup>4</sup> is treated with 4 drops of trichloroacetic acid<sup>5</sup> heated to boiling one-half minute:

I. Precipitate: To 50 c.c. urine (freed from nucleoalbumin and mucin<sup>4</sup> by precipitation in the cold with acetic acid), which should be neutralized<sup>6</sup> and filtered, add a saturated solution of magnesium sulphate.

a. In the warm an insoluble precipitate (Globulin).

<sup>1</sup> If the urine contains blood there remains upon the filter the coagulum of fibrin. The urine is strained through linen and the coagulum is washed with water. This coagulum is insoluble in pure water but soluble in sodium fluoride 1 : 100 or in sodium chloride 10 : 100.

<sup>2</sup> In many urines are found precipitates of urates and uric acid which are not flocculent but possess a crystalline form readily discernible under the microscope.

<sup>3</sup> According to Leidie the mucin of a decomposed urine which shows an ammoniacal fermentation is also a nucleoalbumin; what has been identified in

Control reaction: It is precipitated by a stream of  $\text{CO}_2$  and by a concentrated sodium chloride solution and ammonium sulphate.

b. Solution. When acidified with 2 or 3 drops of acetic acid  $\frac{\text{N}}{10}$  and boiled, a precipitate is produced.

1. Soluble when a drop of crystallizable acetic acid is added [Albumine (acetosoluble)].

Control reaction: It is thoroughly precipitated by adding ammonium sulphate in excess. Trichloroacetic acid precipitates the same out of the acetic acid solution.

2. Insoluble when a drop of glacial acetic acid is added (Serin).

Control reaction: Precipitated by adding ammonium sulphate in excess and by concentrated mineral acids.

II. Solution. The bulk of the precipitate can be separated from the boiled solution by allowing it to cool.

c. Precipitate, soluble in warm alkali which in the cold is insoluble (Albumose).

Control reaction: Will be precipitated by ammonium sulphate in excess. Hydrochloric acid added to the urine gives a precipitate in the cold which disappears upon heating and reappears after cooling. With acetic acid—tannin the albumose is precipitated. The double iodides of potassium and mercury, as well as picric acid, give with the urine a voluminous precipitate soluble upon heating.

D. If a precipitate be present or not, 20 c.c. of the urine are taken, to which is added, with vigorous shaking, crystallized ammonium sulphate to saturation; allow to settle and filter. To the filtrate is added 2 or 3 drops of very dilute copper sulphate solution, after

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such urines as pyrin is nothing other than an alkaline albuminate, produced by the action of ammonia upon the albuminous material (that is, the pus). An unfermented urine containing pus does not show the characteristics of mucins or pyrins (precipitated with acetic acid).

<sup>4</sup> If the mass of nuclealbumin or mucin is small, then the addition of acetic acid produces a uniform cloudiness that lasts after the filtration. The precipitation of the flocculi can be hastened by a dilution with one or two volumes of water; after a few hours it is filtered and in this manner a clear fluid is obtained, and in which the other albuminous constituents can be looked for.

<sup>5</sup> The trichloroacetic acid also precipitated the alkaloids, yet the precipitate disappeared upon dilution with water, by heating, by adding alcohol, and by an excess of this acid.

<sup>6</sup> It is neutralized with potassium or sodium hydrate until a rose color appears upon the addition of phenolphthalein.

which soda is added in slight excess, producing a violet color (Peptone).

Control reaction: The filtrate from the urine saturated with ammonium sulphate is diluted with equal volumes of water and acetic-acid-tannin, which forms a precipitate.

W. S. WEAKLEY.

#### THE IDENTIFICATION OF TYPHOID BACILLI.

Hayaschikawa found, *Apoth.-Zeit.*, 1901, p. 734, that by the use of urine gelatine nutrient media,<sup>1</sup> he was able to distinguish a colony of typhoid bacilli from a colony of the common colon bacilli with which the typhoid bacilli are often mixed, and which are often mistaken one for the other, especially in inexperienced hands. These investigations were carried out with a 3.3 per cent. urine gelatin and the bacilli were grown at a temperature of 22° C. The urine gelatin media must not be too old, the temperature must be uniform, and the colonies must not be planted too closely together to get the characteristic frayed margin of the deeper colonies of these two bacilli.

A discrimination, however, can be made between these two bacilli as follows: First, by the size, for the typhoid colonies in the same stage of development are from one-fourth to one-half times smaller than the colon colonies. Secondly, by the color, for the typhoid colony remains a clear yellow for about forty-five hours, whilst the colon colony appears much darker. Thirdly, by the nature of these thread-like appendages<sup>2</sup> constituting the frayed margin; with the typhoid colonies these threads are much longer, more delicate and more twisted than in the colon colonies in which they appear shorter, more quickly thickened, plaited and are less strongly twisted.

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<sup>1</sup> Sometimes a crystal formation interferes with this thread-like formation, and, as a remedy, the urates and phosphates should be separated before the urine is added to the gelatin. The writer proceeds as follows: Allow the urates to separate by cooling the fresh and normal urine, filter, make alkaline with a concentrated sodium hydrate solution and allow to stand twenty-four hours to permit the phosphates to separate. The last procedure is not absolutely necessary, as it has been shown that the phosphates do not usually precipitate in a slightly alkaline mixture.

<sup>2</sup> In the usual 3.3 per cent. meat water nutrient gelatin this thread-formation is not so marked.

In the 6 per cent. urine gelatine which melts at 28° the fraying is not as clearly marked as in the 3.3 per cent. The time for the examination of the colonies is between twenty and forty hours. From the fortieth hour, the frayed character becomes obliterated and makes observation difficult.

W. S. W.

#### NEW REMEDIES OF 1901.<sup>1</sup>

Tyratol—See Thymatol.

Tyrosal—Antipyrine-salicylacetate.

Urea Quinate—See Urol.

Uresin—Urotropin-lithium citrate. Solvent for gravel. (Do not confound with urosin-lithium quinate).

Urol—Urea Quinate. Used in gout and gravel (both urinary and renal).

Urosteril—Preparation containing extract of pichi pichi. Antigonorrhoeic.

Urotropin Lithium Citrate—See Uresin.

Uzane—Dental anesthetic.

Vegetaline—A kind of butter prepared from cocoanut.

Vioform—Iodochloroxyquinoline. Succedaneum for iodoform.

Voandzou—*Glycine subterranea*. The seeds are highly nutrient.

Xanol—Sodium-caffeine salicylate. Diuretic.

Xeranthemum Annuum—A Compositæ recommended as a cardiac tonic.

Xylopia Æthiopica—Æthiopian pepper. Macerated fruits are used as an embrocation; the decoction is used in bowel complaints; fruit also anthelmintic and aphrodisiac.

Zomol—Nutrient prepared from meat.

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#### EDITORIAL NOTES AND COMMENTS.

##### A MEMORIAL TO DR. CHARLES RICE.

In the January issue of this JOURNAL attention was directed to a movement which had for its object the marking of the grave of Dr. Charles Rice with a suitable monument. Since that time a communication has been received from Joseph P. Remington, the Chairman of the Committee of Revision of the U. S. Pharmacopœia, from which the following extract is taken:

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<sup>1</sup>Merck's Report, January, 1902.

"The Board of Trustees and Committee of Revision of the United States Pharmacopœial Convention have inaugurated a movement to erect a monument and prepare a volume containing a portrait, with a sketch of the life and labors of their late beloved Chairman, Dr Charles Rice. A memorial fund has been started by the committee and an appropriation made. As soon as the movement began, it became evident that the many friends of Dr. Rice throughout the country would be glad to make contributions." . . . "Mr. Samuel A. D. Sheppard, the well-known Treasurer of the American Pharmaceutical Association, has consented to act as chairman of the fund, and he will receive all subscriptions."

It is not necessary to urge this matter unduly, as we believe that it is only necessary for the friends of Dr. Rice to know of this movement in order for them to contribute to the proposed fund.

#### THE CHEMISTRY OF IONS.

In a summary on the "Dissociating Power of Different Solvents," H. C. Jones (*Amer. Chem. Jour.*, 1901, 249) says:

(1) That with the exception of hydrogen dioxide water is the strongest ionizer. Next to this comes formic acid. Of the more common solvents, methyl alcohol dissociates to a much greater degree than ethyl alcohol. Indeed it is true, in general, that *in an homologous series of solvents the lesser members have the greater dissociating power.*

(2) The dissociating power of a solvent appears to be a function of *all* the physical or chemical properties of a substance and not of any one function.

(3) The results of a great many experiments tend to show the chemical inertness of molecules. Most, if not all, chemical reactions are reactions between ions, and molecules as such do not enter into the reactions at all. As the reactions proceed, and the ions already present are used up, the molecules are gradually dissociated and furnish new ions, which then enter into the reaction. *The chemistry of atoms and molecules has thus given place to the chemistry of ions.*

#### PENNSYLVANIA HOSPITAL.

The sesqui-centennial, 150th, annual report of the Pennsylvania Hospital shows the hospital to be well equipped for the care of the sick and injured, and its managers devising ways for administering

to those (as those afflicted with senile dementia) who do not seem to have been considered as proper cases for "homes" and hospitals. It is interesting to note that Frederick Fraley, one of Philadelphia's best known public-spirited men, presided at the 150th annual meeting of the contributors. Since that time he has departed this life, having contributed for years his support, presence, and influence to the perpetuation of scientific educational and organized beneficent work in the city of Philadelphia.

#### HUMAN AND BOVINE TUBERCULOSIS.

In *Pediatrics*, August 15, 1901, appears the following résumé of this subject:

"Koch's views in regard to the non-transmissibility of bovine tuberculosis to man, as set forth in his address delivered before a General Meeting of the British Congress on Tuberculosis, have by this time become pretty generally familiar throughout the lay and medical worlds. He has stated fairly positively what cannot be demonstrated except indirectly. The indirect demonstration, however, he regards as fairly conclusive, as he says: "It is well known that the milk and butter consumed in great cities very often contain large quantities of the bacilli of bovine tuberculosis in a living condition, as the numerous infection experiments with such dairy products on animals have proved. Most of the inhabitants of such cities daily consume such living and perfectly healthy virulent bacilli of bovine tuberculosis, and unintentionally carry out the experiment which we are not at liberty to make. If the bacilli of bovine tuberculosis were able to infect human beings many cases of tuberculosis caused by the consumption of alimenta containing tubercle bacilli could occur among the inhabitants of great cities, especially the children." He holds that tuberculosis can only be assumed with certainty to be caused by alimenta when the intestine suffers first. Only twice does he remember having seen primary tuberculosis of the intestine. He cites statistics to prove how exceedingly rare this affection is, and does not think it at all necessary to have to assume infection by the bacillus of bovine tuberculosis to explain the few cases of primary intestinal tuberculosis that do occur. He also considers that he has conclusively proved by experiment that human tuberculosis cannot be transmitted to animals. These propositions



are not new but have never before been *so positively* enunciated by an authority on this disease.

"In an address before the Canadian Medical Association in August, 1899, Professor Adami called attention to how scanty the evidence was to prove the transmission of animal tuberculosis to man. He also stated that human tubercle bacilli when inoculated into cattle would produce only local and transient effects. In a paper read before the British Medical Association, August, 1899 (*Pediatrics*, Vol. VIII, No. 8, 1899) Dr. George F. Still, after analyzing 269 necropsies on tuberculous children under twelve years of age, concluded that the commonest channel of infection with tuberculosis in childhood is through the lung; that infection through the intestine is less common in infancy than in later childhood; that milk, therefore, is not the usual source of tuberculosis in childhood, perhaps due to precautions taken in boiling and sterilizing; that inhalation is the commonest mode of infection in the tuberculosis of childhood and especially infancy, etc. So it is evident that medical thought has been tending in this direction for some time. This is a subject of vast import and nowhere can the adage '*festina lente*' be more fittingly applied."

On the other hand, in the introduction to his admirable paper on the "Relation of Bovine Tuberculosis to Public Health," Salmon, the chief of the Bureau of Animal Industry, says:

"In treating of the communication of tuberculosis from cattle to man, it is first shown that the statement that human tuberculosis is not communicable to cattle is unwarranted by the evidence, since both Martin in England, and Chauveau in France have obtained positive infection and extensive disease by feeding to cattle tubercular material from human sources. It is further shown that the human and bovine diseases cannot be entirely different, because tuberculin produced from human bacilli causes reaction in bovine tuberculosis. Another argument used in this connection is that the whole list of diseases which affect a wide range of animal life, being communicable between widely separated species of animals, there is no other disease which is not also communicable to man. The inference is, therefore, that as bovine tuberculosis is communicable to a large number of species and to widely separated forms of animal life, it is also communicable to man.

"As more direct evidence, there are cited cases to establish—

"(1) The accidental infection of man by inoculation with bovine bacilli.

"(2) The infection of man by consuming the milk of tuberculous cows.

"To corroborate this evidence statistics are presented proving the occurrence with mankind of a large number of cases of intestinal and other abdominal forms of tuberculosis,\*particularly in England and Scotland. It is shown that there is no relation between the total number of cases of tuberculosis and the cases of abdominal tuberculosis in various countries, and the conclusion is drawn that the primary abdominal tuberculosis probably is not caused entirely by infection from other causes of human tuberculosis. It is also shown from statistics of postmortem examinations carefully made by competent persons that in some parts of the world at least there is a considerable proportion of cases of tuberculosis in man in which the infection occurred through the intestine.

"These lines of evidence are clearly opposed to the principal assertion made in the paper read by Koch at the British Congress on Tuberculosis this year. But this is not the worst aspect of the case, since the evidence of Delepine and Still indicates that there are many more cases of intestinal tuberculosis in children than are actually discovered or recognized. More than this, it is shown on the evidence of such competent witnesses as Woodhead, St. Clair Thompson, and Lord Lister that infection through the medium of the food may not necessarily be accompanied by disease of the intestines. The organs first attacked after feeding on tubercular material may be the mesenteric glands and liver, or even the bronchial and mediastinal glands and the lungs. While, therefore, the facts show that the intestines are sometimes the first organs attacked after tubercular infection is taken into the digestive organs through the mouth, they also show that the number of cases of primary intestinal infection is no indication of the number of cases in which the infection has been carried by the food."

In commenting upon the above, the editors of the Bulletin issued by the Delaware State Board of Health say: "In our praiseworthy agitation of a pure milk law we must not forget that milk may contain substances far more destructive to life than the usual adulterations. Even formaldehyd sinks into insignificance when compared with tubercle bacilli and pus-forming organisms."

## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

A very timely "Treatise on Smallpox" is announced for publication early in April by J. B. Lippincott Company. It is written by Dr. George Henry Fox, Professor of Dermatology in the College of Physicians and Surgeons, New York City, with the collaboration of Drs. S. Dana Hubbard, Sigmund Pollitzer, and John H. Huddleston, all of whom are officials of the Health Department of New York City, and have had unusual opportunities for the study and treatment of this disease during the present epidemic.

The work is to be in atlas form, similar to Fox's "Photographic Atlas of Skin Diseases," published by the same house. A strong feature of the work will be its illustrations, reproduced from recent photographs, the major portion of which will be so colored as to give a very faithful representation of typical cases of variola in the successive stages of the disease; also unusual phases of variola, vaccinia, varicella, and diseases with which smallpox is liable to be confounded. These illustrations number thirty-seven and will be grouped into ten colored plates,  $9\frac{1}{2} \times 10\frac{1}{4}$  inches, and six black-and-white photographic plates.

The names of Dr. Fox and his associates assure the excellence of the work, in which will be described the symptoms, course of the disease, characteristic points of diagnosis, and most approved methods of treatment.

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## PHARMACEUTICAL MEETING.

The fifth of the series of pharmaceutical meetings of the Philadelphia College of Pharmacy, for 1901-1902 was held on Tuesday, February 18th. Mr. James T. Shinn, Treasurer of the College, presided.

The first speaker was Prof. Edgar F. Smith, Professor of Chemistry and Vice-Provost of the University of Pennsylvania, who read a valuable paper on "The Basis of Atomic Weights." He reviewed the work of Dalton, the philosopher, and of Berzelius, the eminent experimenter, who enriched science in every field he investigated. The former is known chiefly because he promulgated the doctrine that the weight of the hydrogen atom equals 1. Berzelius developed methods of research, and he chose oxygen as a standard for

comparison, as most elements form oxides or compounds with oxygen.

Professor Smith referred to some of the difficulties in determining atomic weights, and illustrated the same with the work which he and his students have been carrying on for a number of years in the Harrison Chemical Laboratory, particularly on palladium and tungsten.

Berzelius gave the value of 100 to oxygen, but this is no longer retained. Three systems have been used in calculating the molecular weights of organic compounds: (1)  $H = 1$ ;  $C = 12$ ;  $O = 16$ ; (2)  $H = 1.008$ ;  $C = 12$ ;  $O = 16$ ; (3)  $H = 1$ ;  $C = 11.91$ ;  $O = 15.88$ . The speaker showed in a few instances what great differences would result in the calculation of the molecular weights of oxalic acid, or the sugar  $C_{12}H_{22}O_{11}$  with the three systems. Furthermore, inasmuch as the great work of Beilstein, in which over 70,000 organic compounds are described, is based on the first of these systems, it would mean a recalculation of all these compounds, for, as Morley has shown, if  $H = 1$ , then oxygen equals 15.88, and if oxygen equals 16, then hydrogen equals 1.008.

Professor Smith referred to the labors of the committee of the German Chemical Society, and compared the international and didactic tables published by them. He then gave some of the arguments in favor of the standard that hydrogen equals 1 as follows: (1) It is the original Daltonian standard; (2) it is the most natural basis, because hydrogen is the lightest atom known and is the standard for determining the densities of gases and valence; (3) if oxygen is made the standard, then all vapor densities must be changed; (4) with the physicist hydrogen is the standard; (5) hydrogen has a uniform rate of expansion; (6) the difficulty of teaching that  $H = 1.008$ .

The following are some of the features in favor of the standard oxygen equals 16.00: (1) Few elements can be compared directly with hydrogen, of all the elements known, but seven or eight have had their atomic weights compared directly with oxygen; (2) with oxygen as the standard the atomic weights of a very large number of the elements are whole numbers, as is seen in a comparison of the international ( $O = 16.00$ ), and the didactic ( $H = 1$ ) tables; (3) this is of very material importance in making calculations in quantitative analysis; and (4) must be less burdensome to the memory;

(5) all the organic compounds given in Beilstein are based on the standard  $O = 16$ ; (6) all the actual workers in making atomic weight determinations prefer oxygen as the basis. Professor Smith referred to the fact that other elements had been proposed as the standard for comparison, viz., carbon, silver and iodine, but stated that oxygen had met the demands for comparison. He also stated that it is possible that if carbon were taken as the standard that it would meet the various objections of the adherents of the two other standards. In conclusion, Professor Smith said that one writer claimed that if we accept hydrogen as the standard, then we must put ourselves back one century and must wait fifty years to be where we are to-day.

The paper was discussed by Professors Remington and Sadtler, Mr. Shinn and Mr. Wilbert. The latter suggested that inasmuch as all the continental countries had adopted the standard oxygen equals 16, that it would be well if the U.S.P. could do likewise.

The next paper was on "Adulteration of Drugs and Foods," by Dr. Albert Robin, Delaware State Board of Health. The paper was discussed by Messrs. Boring, Lowe, Shinn, Miller, Poley and others. Dr. Miller alluded to the fact that Americans are not the only people who are gullible in the respect of taking patent medicines, but that these are sold extensively in all the principal cities of Europe which he had visited recently. Mr. Poley spoke of the inconsistency of people taking the labels on patent medicines, for gospel, when they would not accept the check of a man unless they knew something of his character or standing.

The last paper was by Mr. Wilbert on "Dose Measures and Measured Doses." (See page 120). The paper was discussed by Messrs. Lowe, Boring, Wiegand, Shinn, and others.

In answer to Dr. Lowe's remarks on the methods of engraving graduates, Mr. Wilbert said: It must be remembered that medicine glasses are not graduated with the same care. As indicated in the paper, medicine-glasses are, as a rule, graduated correctly at but one point, and the intervening graduations are filled in usually according to rule of thumb. This point is well illustrated by tables 2 and 3 of the paper. Medicine-glasses that are graduated by means of a block pattern occasionally suffer from the same cause; in one lot that Mr. Wilbert had seen, the measure was evidently measured at the teaspoonful quantity, and the block sub-

sequently divided for the teaspoonful quantities with little or no regard for the actual capacity of the glass.

Mr. Wilbert called particular attention to the fact that all of these glasses are absolutely unreliable, for one reason or another, for measuring teaspoonful quantities of medicine containing active or poisonous ingredients.

The variation of spoons is due largely to the fact that a comparatively large quantity of liquid may be heaped up on a full spoon; for instance, a teaspoon that, when filled to the brim, holds but 5 c.c., will, when heaped with a liquid having the viscosity of water, readily hold 8 c.c.; the dessertspoon can be made to hold nearly 14 c.c. and the tablespoon nearly 19 c.c.

While drops are admittedly uncertain quantities, it is possible to have a dropper that will be much more accurate and reliable than the proposed standard dropper now before the Pharmacopœial Revision Committee. In reference to minim measures, would it not be more in keeping with pharmaceutical standards, he said, if we should advocate a measure graduated in the metric system. Personally, he thinks that any factor that would advance the introduction or use of the metric system would be of advantage.

Mr. Wiegand alluded to another form of graduate measure which commends itself to the careful pharmacist when dispensing active remedies, viz., the measure shaped like a Theban vase and prolonged at the upper end into a narrow neck, upon which the capacity is marked. This avoids the variation which a wide surface renders almost inevitable in rapid work.

The following provisional program has been arranged for the next meeting on Tuesday, March 18th:

Liquid Soaps for Surgical and Toilet Purposes. By M. I. Wilbert, Apothecary at the German Hospital, Philadelphia.

Deodorized Opium Preparations. By Albert E. Ebert, Chicago.

The Spread of Tuberculosis by Coughing. By Dr. L. Napoleon, Boston.

Ricin Soap. By Frederick T. Gordon.

H. K.

# THE AMERICAN JOURNAL OF PHARMACY

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*APRIL, 1902.*

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## ON THE MANUFACTURE OF DEODORIZED OPIUM AND TINCTURE.

BY ALBERT E. EBERT, of Chicago.

It is now about thirty-five years since the writer first recorded in the AMERICAN JOURNAL OF PHARMACY his observations on the process of manufacturing deodorized opium and its tincture. It may not be out of place briefly to review some of the facts pertaining to the history of this subject, as well as to recall the suggestions that have been made for improving the official process and make known the medical properties of the preparations.

During the 20's a liquid preparation of opium made its appearance in England under the name of "Liquor Opii Sedativus," manufactured by R. Battley, of Front Street, London. The claim set forth by the originator was that the preparation represented all the beneficial and wholesome and none of the noxious properties of the drug. Possibly this claim and suitable representations of its superiority over the existing official liquid preparations of opium soon made it a popular remedy with the medical profession of England and this country at that period. Although the method of making the preparation was kept secret, yet it was known that the odorous, resinous and some of the other principles of opium had been abstracted from it.

Dr. Thomson, an eminent authority and writer on therapeutics of that period, states that the opium was exhausted with dilute acetic acid, the liquid filtered and evaporated to a dry extract, which was again dissolved in water, and wine or alcohol added in sufficient

quantity to preserve the preparation, which was then made up to the strength of laudanum.

Another writer of that period gives the following formula: Make an aqueous extract of opium from the crude drug, and take of this

Extract of opium . . . . .	750 grains.
Boiling water . . . . .	16 ounces.
Alcohol . . . . .	4 ounces.

Dissolve the extract in the boiling water; allow to cool; add the alcohol; let stand for twenty-four hours; filter through paper and add enough water to measure 20 ounces.

M. Robiquet, of Paris, he who named *narcotine*, proposed a new mode of preparing an extract of opium in the *Journal de Physiologie Experimentale* for January, 1821, as follows:

Make a solution of the crude opium in cold water in the same way as if the aqueous extract were to be prepared; filter and evaporate the solution to the consistency of a thick syrup; shake this repeatedly with ether; decant the ether and evaporate the solution of opium to the consistency of an extract.

In the year 1828, Dr. Robert Hare, Professor of Chemistry in the University of Pennsylvania, suggested the use of ether in the process of preparing laudanum, and by its use removing the objectionable principles contained in this official preparation.

Early in the 30's there appeared on the American market a preparation entitled "McMunn's Elixir of Opium." This, like Battley's, was a secret and a proprietary remedy, and by being extensively advertised, soon became a well-known nostrum, much used by the medical profession, and its popularity has continued to the present time. Although it has no merit of originality—for it was subsequently ascertained that the process for its manufacture was that suggested and published by Professor Hare—yet it has flourished, nevertheless, and prospered, while the original discoverer received no pecuniary reward and little credit—another illustration of how quackery succeeds at the expense of honorable scientific work. Augustine Duhamel, in the *AMERICAN JOURNAL OF PHARMACY*, 1846, commenting on McMunn's Elixir of Opium, stated that an equally good and efficient liquid preparation of opium could be obtained by exhausting the opium with cold water. He laid special stress upon the fact that the noxious principle, *narcotine*, being very insoluble in cold water, was, with the resin, caoutchouc and ligneous matter, not



taken up or dissolved by the solvent. Dr. Carson, then the editor of this publication, in a footnote, calls attention to the fact that the prevailing opinions regarding the medical properties of *narcotine* were at variance, some authorities claiming for it poisonous properties; others asserting that it had hardly any toxic properties, if not being entirely inert; while still others claimed for it stimulant tonic characteristics.

We next reach the contribution of Eugene Dupuy, of New York City, in the AMERICAN JOURNAL OF PHARMACY for July, 1851, entitled, "On a Substitute for McMunn's Elixir of Opium." The process advanced consisted in the use of cold water in extracting the opium, and in all essential features was similar to the formula of Duhamel. A footnote to this paper by the editor, Prof. William Procter, Jr., is very comprehensive, and in summing up he says:

"In glancing over the long list of the constituents of opium with the view of singling out those to which the unpleasant effect of laudanum may be attributed, perhaps none are more open to suspicion than the odorous principle, resin, acid extractive, thebaine, and perhaps *codeine* and *narcotine* to some extent, although O'Shaughnessy and others have shown that it is extremely doubtful that the latter (*narcotine*) possesses any disturbing quality of the kind." Further on he says: "Landerer, on page 251 of this number of the JOURNAL, speaks of the nauseating and other unpleasant effects produced by the exhalations from poppy plantations during the collection of opium. May not the odorous principle have something to do with this effect, and may not the removal or loss of this in the so-called *denarcotized laudanum* and in *old opium pills* be at least partially the reason of their diminished tendency to produce nausea and headache?" He continues by saying: "Professor Redwood considers the 'sedative liquor of Battley' to be an aqueous solution of opium evaporated to dryness to rid it of the odorous and acid resin, re-dissolved in water, and a small portion of spirit added to give it permanence."

Next in order we come to Dr. E. R. Squibb's contribution which was published in the AMERICAN JOURNAL OF PHARMACY for March, 1860. It is entitled, "Opium as a Therapeutic Agent." In this paper the doctor calls attention to the inefficiency of morphine and its salts fully to represent the medical properties of opium, and gives a formula for a liquid preparation of the drug which should

more fully meet the requirement. He entitles the preparation, "Liquor Opii Compositus." The process of manufacture is based on the extraction of opium with water, the infusion concentrated by evaporation, the product precipitated with alcohol, which separates the albumen, gum and extractive matter; the clear alcoholic liquid is now evaporated to a syrupy consistency, shaken with ether, the ether separated, and to the purified residue alcohol, compound spirit of ether and water are added sufficient to bring to the strength of tincture of opium. Later on the Hoffman's anodyne was replaced by acetic ether.

About the year 1863 the fifth decennial revision of the United States Pharmacopœia was issued, and now for the first time there was furnished an authoritative formula and process to supersede the unofficial and official preparations of opium, which had been considered objectionable on account, either of being proprietary, or that of containing noxious properties, thereby excluding their use in some conditions of disease or the idiosyncrasy of the individual. The adopted formula was undoubtedly constructed and furnished by Professor Procter, and the new galenical was hailed with considerable satisfaction by professional workers.

The writer at this time was employed by Professor Parrish as his assistant in his School of Practical Pharmacy, Eighth and Arch Streets, Philadelphia, and during the course of instruction in the years of 1863 and 1864 each group of students prepared one pint of this deodorized tincture of opium. The numerous operations which took place there by different persons brought out early what seemed objectionable in the process, the most serious difficulty being the separation of the ether from the concentrated infusion after shaking together; the second objection was the expense of the ether treatment. We had soon collected several gallons of ethereal solution, which we tried to purify by distillation, but did not succeed in doing so owing to the danger of fire. The accumulation, which itself was a fire risk, was, after a number of efforts to utilize it, thrown away.

On returning to Chicago the writer became associated with the house of E. H. Sargent, manufacturing chemist, and here again the problem presented itself to him—how to recover the ether without distillation? He finally discovered that the substances which had been taken up by the ether from the aqueous solution of opium

would, by the addition of a caustic alkali, be again thrown out of solution; and in the paper he contributed on the preparation of deodorized tincture of opium, and published in the AMERICAN JOURNAL OF PHARMACY for May, 1867, he gave the following directions:

“Take of common caustic potash one troy ounce; place it in one pint of the ethereal solution, having previously added two fluid ounces of water, and agitate; let stand, and when separated decant the ether, which wash by shaking with distilled water; allow to separate; decant again the ether and keep the same for future use in the manufacture of the preparation.” There was no other loss than a certain percentage of waste of ether in the operation of purification.

On examining the substance that had separated from the ethereal solution by the addition of caustic alkali, the writer found it to consist largely of gummy and resinous substances, which were strongly impregnated with the peculiar odor of opium. On treating this precipitated mass with petroleum benzin, he found that nearly all was taken up by the solvent, excepting some dark coloring matter and a crystalline body which, on further examination, he satisfied himself was largely composed of *narcotine*. This feature led to the thought that, as benzin was an equally good solvent for what was considered the noxious substances and did not dissolve the crystallizable principles of the opium, it was superior to ether even aside from its economical advantages.

On putting the above to a test, the writer satisfied himself that his reasoning was in a practical direction, and, after some experimentation, a formula was devised for preparing deodorized tincture of opium in which formula petroleum benzin was substituted for ether. Also, a formula was given for preparing deodorized opium, petroleum benzin being used as the purifying agent. The paper also contained the suggestion that the writer believed it to be a mistake to remove the *narcotine* from any of the preparations of opium.

In the AMERICAN JOURNAL OF PHARMACY for February, 1883, R. Rother contributed a paper on a new process of preparing deodorized tincture of opium, the process being based on the use of a mixture of petrolatum (vaseline) and spermaceti for removing the odorous and resinous matters from the aqueous solution of opium.

In the August number of the same publication George W. Sloan called attention to the fact that in following the process of Mr.

Rother about half of the morphine contained in the opium was lost to the finished tincture. In the December number of the same volume Mr. Rother makes a reply in which he states that he believes the loss of morphine to be due to a fault in the directions given by him in extracting the opium, and not to the mixture of fats for deodorizing.

Next in order, a paper was contributed to the *Druggists' Circular* for April, 1887, by C. E. Federer, in which a process is recommended for preparing deodorized tincture of opium by exhausting the opium with hot water and reducing the temperature of the aqueous solution to the freezing point. This has the serious objection that, while it separates the resinous, fatty and oily matter and *narcotine*, it also throws out of solution a large per cent. of the morphine.

We come now to a period in our review where the committee on revision of the United States Pharmacopœia takes up the subject for research and delegates Prof. E. L. Patch to investigate the supposed advantages that benzin has over ether in the removal of *narcotine*, etc. The wording of the instructions for the inquiry was unfortunate, as there has never been any claim made by those who had recommended the use of benzin that it would remove the *narcotine*, but on the other hand, the claim was that benzin would not extract the morphine or the *narcotine*, and that ether would take out some of the former and nearly all of the latter in the process of preparing deodorized opium. Professor Patch, following the instruction, made a very careful investigation of the subject as submitted, and reported the result at the Baltimore meeting of the American Pharmaceutical Association, 1898, and published in the proceedings, Vol. XLVI, p. 373, from which we copy:

“Comparison.—Lots of 100 grams of No. 40 opium, assaying 16.1 per cent. morphine, washed respectively with 1,400 c.c. of benzinum and ether gave the following results:

	Benzin.	Ether.
Weight of extracted and dried opium . . . . .	91.00	80.500
Weight of morphine and dried opium . . . . .	15.05	14.580
Weight of morphine lost in washing . . . . .	none	.015
Weight of <i>narcotine</i> lost in washing . . . . .	.18	4.425

“Conclusion.—Benzinum, or petroleum ether, is not adapted for use in washing *narcotine*, etc., from opium in making deodorized

tincture, on account of its uncertain character, its low range of solvent power and its disagreeable odor."

We have now come to the last contribution of our review. It was presented at a pharmaceutical meeting of the Philadelphia College of Pharmacy in November, 1900, and was printed in the December number of the AMERICAN JOURNAL OF PHARMACY for that year. It is entitled, "An Improved Process for the Preparation of Deodorized Tincture of Opium," by Frederick T. Gordon, and is based upon the substitution of paraffin for ether in removing the noxious principles from the preparation.

We will now comment upon the reviewed processes. During the 70's, in making a lot of deodorized tincture of opium, an emulsification took place, which was so persistent that it baffled our efforts to effect a separation of the benzin from the concentrated solution of opium. Mr. R. Rother, who was at the time in the employ of the writer, suggested the addition of melted vaseline to the emulsified solution. This happy thought of Mr. Rother, which speedily produced the separation desired, led to further experimentation with this fat. However, it soon became apparent that whenever vaseline was employed in the process, it was always at a loss of the morphine salt, and its use was therefore discontinued. A more satisfactory method which we found to prevent the emulsion is to concentrate the opium infusion to but one-half of its bulk and shake with the benzin, when it will separate readily.

Some time later, when Mr. Rother had gone into business on his own account, he published the paper advising the mixture of vaseline and spermaceti, a trial of which at the time and experiments since with other fats have convinced the writer that, if any part of the morphine is in the free alkaloidal state, it will be taken up and lost in the process of deodorization when such mediums are employed.

On the publication of Mr. Gordon's article recommending paraffin for this purpose, the writer made trials with three different lots of opium, the solutions of which were assayed each time just previous to treatment with the paraffin and after such treatment, three assays being made in each case. The results of this process were:

		Before.	After.
(1)	Opium solution . . . . .	12'91	9'24
(2)	" " . . . . .	13'87	8'58
(3)	" " . . . . .	13'14	8'40

showing an average loss of 4.65 per cent. of morphine.

We will now consider and analyze Professor Patch's investigations. His objections to the use of benzin are: First, that it does not remove *narcotine*; second, its uncertain character, its low range of solvent power and its disagreeable odor.

In answer to the first objection that the benzin does not remove the *narcotine*: This, in the writer's opinion, is the very reason why benzin should be used, for he believes that *narcotine* should not be extracted, as it is not a noxious, but a most beneficial principle of opium; it is not narcotic, but a pure stimulant tonic, and is the very principle which prevents the depression that always occurs when morphine is administered alone. The writer has at different times administered to himself *narcotine* which he has prepared and knew to be perfectly free from any of the other principles contained in opium. This pure *narcotine* he has taken in doses of from one to three grains, every hour, until a dozen or more doses were taken, and the effect has always been that of a stimulant tonic, free from any narcotism.

To the second objection of Professor Patch, the uncertain character of benzin, its low range of solvent power and its disagreeable odor, we have the following to offer:

The benzin of the United States Pharmacopœia, as to its official title, is unfortunate, for the reason that the only articles that are obtainable in the market under the name of benzin are the naphthas of low specific gravity, ranging from 0.798 to 0.723, very impure, having a strong and disagreeable odor, and principally used in the arts for painting. The Pharmacopœia defines benzin as a transparent, colorless, diffusive liquid, of a strong, characteristic odor, slightly resembling that of petroleum, but much less disagreeable, and having a neutral reaction, specific gravity 0.670 to 0.675.

The only products that meet the requirement of the Pharmacopœia are the best of the higher gravities of gasolines, which are known in the market as 87° and 88° Baumé, the specific gravity of which ranges from 0.650 to 0.645. The existing difficulty of obtaining these light products is that they are not on sale in the market in less quantities than barrel packages. This condition of things would be changed if a demand were made, for the wholesale drug trade would then keep these grades for sale, as they do now a gasoline of 67° Baumé (sp. gr. 0.716), known as stove gasoline, which is, however, not of such quality and purity as to fit it for use in the deodorization of opium.

In our long experience with these high-grade gasolines on opium we have never met the objection of a disagreeable odor remaining in the finished product. In making inquiries among manufacturers who employ these petroleum ethers in extracting oils, fats, resins, etc., from drugs, we find that our experience is borne out. We hope that the committee on the revision of the Pharmacopœia will give an official name to these lighter products of petroleum of light specific gravity, by which name they can be secured in the market. The present name, benzin, when called for, does not bring the product which the Pharmacopœia demands.

Referring to Professor Patch's table of comparison, we find that ether extracts about  $\frac{1}{2}$  per cent. more morphine than is extracted by benzin; that ether removes, if not all, nearly all the *narcotine*, while benzin takes up hardly any. As Professor Patch has no other solvent to suggest, and has tried others, we must still adhere to our position that benzin is the best medium for deodorization.

The remaining processes and formulas that have been suggested and which have been reviewed in this paper may be classed under two headings. The first class includes those by which the opium is extracted by cold water, the infusion evaporated to the consistency of a dry extract, and this dissolved again in water and alcohol added. When thus prepared such products are but aqueous extracts of opium to which sufficient alcohol has been added to preserve them. They can possess no other medicinal value or merit over the dry extract than that of being liquid, and but serve to add to the already large number of preparations that overburden the stock of the drug store.

The second class are the concentrated aqueous infusions, treated with ether to remove the noxious principles which may have been taken up in a very slight degree by the solvent power of the cold water used in exhausting the opium. These possess nothing of merit over the first class except it be the added expense due to the ether treatment. The change in the process in the last revision of the United States Pharmacopœia is somewhat in the right line, for it directs the use of hot water for exhausting the opium, by which process all of the morphine, codeine and the greater part of the *narcotine* are brought into solution; however, the ether treatment vitiates much of the good arising from the hot-water treatment by removing the *narcotine*. The term, *narcotine*, is a misnomer, as the

principle is entirely destitute of narcotic properties. When taken into the system it performs the functions of a powerful tonic, and is the very principle contained in opium that will prevent the depression which follows the administration of the morphine alone. All medical authorities agree that opium increases the temperature from the start, producing a pleasant, warming effect, while morphine lowers the temperature. Opium increases the pulse and morphine decreases it. Dr. Squibb, in his paper on "Opium as a Therapeutic Agent," before referred to, says:

"Observers have found that there are certain good effects obtained or certain unpleasant consequences avoided, more frequently by the use of the natural combination, while all agree that the whole therapeutic power and influence of opium cannot be obtained by any salt of morphine." Did not Dr. Squibb make the addition of Hoffman's anodyne to his *liquor opii compositus*—aside from its power of preserving the preparation—for the stimulating and antispasmodic qualities that the compound spirit of ether possesses? We believe he did so.

As early as January, 1821, in the *Journal de Physiologie Experimentale*, Mr. Robiquet, commenting on his new process for making an extract of opium, says that the nauseating principles of opium exercise no beneficial effects on the general economy, but that it is an established fact that the good effects are the result of the action of properties peculiar to the two principles recently discovered in opium—*narcotine* and morphine. He further says: "The results of Dr. Magendie's experiments confirm this view, as *narcotine* acts as a stimulant substance, while morphine is the real anodyne which induces calm sleep."

The writer of the present paper goes further, and says that he firmly believes narcotine to be a most valuable remedial agent in the treatment of the habits of opium, alcohol and tobacco using; and while he is not in a position to claim that it is a specific, yet his limited observation in the administration of this remedy has been of the most encouraging character. Results of the most beneficial character have been obtained. The action of *narcotine* seems to do away with the craving and the prostration which usually follow deprivation from the usual dose of opium, etc., used by the habitu  . We have seen unusually good effects from the administration to these unfortunates of *narcotine* in grain doses



every hour, continuing until from 30 to 60 doses have been administered.

During the time which has elapsed since the writer first became interested in what was originally considered to be an ideal liquid preparation of opium, he has been ever watchful for any suggestions for the improvement of the official process, for he has had a conviction that the preparation, when made by the official process, does not represent the full medical properties of the drug. In his paper upon this subject thirty-five years ago, the writer suggested as an improvement of the official process, aside from the matter of cheapness, the substitution of benzin for ether, upon the ground that benzin did not, while ether did, remove the *narcotine* from the preparation. He has always believed and has many times said, both verbally and in print, that it is a mistake to remove from the deodorized tincture of opium the principle, *narcotine*. With this in view he has, in preparing the deodorized tincture as well as the simple tincture of opium, used every effort to extract and retain in the liquid preparation the *narcotine* of the drug. The process he has found most satisfactory to accomplish this purpose is the following :

Slice the moist opium, place it in a glass, stone or porcelain dish, and by means of a water bath macerate the opium with four parts of hot water for about twelve hours, or until the mass is thoroughly disintegrated. Pour this upon a colander and with stirring and pressure of the hands drain off the liquid. Return the still warm residue to the dish, pour upon it two parts of hot water, macerate again for several hours, keeping up the heat by means of the water bath. Again transfer to colander, press and drain off the liquid as before, repeating the operation of maceration with two parts of hot water and finish as in the other previous proceedings. Mix the liquid obtained by the different operations together, pass through a cloth strainer and commence to concentrate by evaporation to half the bulk of the water employed for extraction. Now take one part of diluted acetic acid and pour this upon the opium residue, macerate by water bath as in above operations for several hours and then place the acid-treated magma upon a coarse cloth strainer and with pressure drain off the liquid. Evaporate this solution to a dry consistency by the heat of a water bath.

Add this dry extractive matter to the watery liquid which is

being evaporated, and when concentration of it has reached four parts by measure let it cool, and add to it an equal volume of gasoline; let stand for twelve hours; separate the gasoline and pass the opium solution through a paper filter and evaporate to half its bulk. Now make a morphine assay and add sufficient diluted alcohol to make the finished liquid opium have a morphine strength of 24 grains to the fluid ounce. A liquid preparation of opium having this morphine strength is to be found in the price-lists of the manufacturers of fluid extracts under different titles. It is recommended by them for preparing easily paregoric, laudanum, deodorized tincture and other liquid preparations of opium, and is said to have a ready sale.

For years the writer has kept this concentrated liquid opium as a stock preparation. He has found that when made more concentrated than four parts by measure to one part by weight of opium used, there will be a separation of crystalline matter, which, on examination, will be found to be largely *narcotine*. When the opium is exhausted only by hot water the average quantity of *narcotine* extracted is about three per cent.; when acetic acid is employed as above directed the amount of *narcotine* extracted averages from five to eight per cent.

We have found that hydrochloric acid is the better solvent for *narcotine*, but have employed acetic acid, as the excess of acetic acid is driven off in evaporating the infusion to a dry state. We have also employed citric and tartaric acids, but they were not satisfactory, as we were unable to adjust the quantity necessary to be used for the purpose.

The writer does not favor a concentrated liquid opium as an official preparation. It is only an additional expense and a danger risk to the pharmacist. We prefer a granular opium which has been freed from its objectionable noxious principles with gasoline. The process that the writer has used is as follows:

The moist opium, by means of a pair of shears, is cut into slices; these are laid on a cloth, which is put into a sieve and set in a warm place to dry. When dry it should be grated. Machines that answer this purpose may be had in the market at a cost of about a dollar. We have found that if the size of the granular powder is from No. 10 to 20 it is fine enough. Now take a glass funnel double the size of the quantity of opium to be operated upon, cork

up tightly the lower end of the stem, but so that the cork can be removed when desirable, and place in the funnel a plain, folded double filter and put the granular opium on the same; press down slightly and pour upon the opium sufficient gasoline to cover it. To prevent evaporation of the gasoline, cover the top of the funnel; let stand over night; then withdraw cork from bottom of funnel, allowing liquid to run into container. Repeat the operation, pouring on gasoline until the solvent takes up no more color from the opium. Now remove the filter containing the opium from the funnel, and spread the opium out to dry, using gentle heat if desired. The gasoline solution extracts from the opium from 2 to 3 per cent. of matter consisting largely of caoutchouc, wax, resin, oily matter, etc., the extracted mass having the strong, peculiar odor characteristic of natural opium.

Reverting again to the granular opium thus purified: The process employed in making the liquid preparations from this purified opium is the same as that used in making it from the crude drug. By this means preparations will be secured having all the beneficial and none of the noxious properties of the drug. We therefore recommend that the next pharmacopœia insert as a new preparation granular opium treated with gasoline. We further recommend that the pharmacopœia give a high-grade gasoline a name that will not cause it to be confused in the market with benzin; we also recommend that *narcotine* be made official as a medicinal agent.

In closing this paper we would recommend that when morphine is prescribed, *narcotine* be added to offset the depressing effects of the former.

## THE SPREAD OF TUBERCULOSIS BY COUGHING.

BY L. NAPOLEON BOSTON, A.M., M.D.

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In view of the popular opinion now prevalent throughout the civilized world that tuberculosis is a disease dependent, in most part, upon certain tendencies transmitted from parent to offspring, it becomes the duty of every one working along these lines to show that tuberculosis is but rarely inherited, but that it is a disease capable of transmission by infected persons to those previously healthy, by contact or by association. It may in like manner be

transmitted by man to domestic animals; while infected animals in turn infect other animals with which they are brought in contact. Man is probably rarely infected by animals, except through the use of milk and meats.

A series of investigations made upon fifty inmates of the Philadelphia Hospital, all of whom were suffering from tuberculosis of either the lungs or throat, showed that such persons emitted a fine microscopic spray, in the acts of coughing, sneezing, talking, laughing and clearing of their throats; and such spray, when collected for microscopic study, was found to contain tubercle bacilli in 75 per cent. of the cases. Sprays collected during coughing always contained many bacilli.

*Method of Collecting Spray.*—This was accomplished by means of a mask which was made from German silver wire, one piece of which is molded to fit the face, resting on the nose, cheeks and chin. To obviate any irritation to the patient, this portion was covered by a piece of rubber tubing. Suspended from this wire is a second oblong portion provided with two lateral grooves, which serve to accommodate two microscope slides. When the mask is in position the slides are held directly in front of the mouth and nose, at a point 3 inches distant from the lips. The mask is held in position by an elastic band which passes above the ears and over the occiput.

Patients were allowed to wear the mask with the clean slides in position for from one to one and one-half hours during the day when they are apt to cough least, and were instructed to remove it during a paroxysm of coughing. It was never worn during the morning or evening; the object being not to collect on the slide the spray produced by vigorous coughing, but to determine whether or not consumptives always emitted a fine spray that was in any way dangerous to the health of their associates.

*Microscopic Study.*—Specimens were fixed and stained by carbolfuchsin and Gabbett's acid blue solution. Of the specimens collected from fifty patients, those from forty-nine were found to contain bacteria, the diplococcus and the streptococcus being the most constant; yet bacilli and clusters of cocci were not unusual. A single minute droplet often contained organisms of each class.

Of these fifty specimens, thirty-eight were found to contain tubercle bacilli in variable numbers, four to six bacilli being the smallest

number found in any specimen; and many of the specimens under a one-twelfth oil immersion lens showed fields of bacilli too numerous to be counted.

Among other findings were large and small squamous epithelium, and occasionally very small epithelial cells more or less intimately connected with thick mucus and leucocytes. The tubercle bacilli were commonly associated with these elements, but were occasionally found singly or a number of bacilli without any other elements in the field.

*Conditions Influencing the Spray.*—From patients showing tubercular laryngitis and from those who talked loudly, or who were frequently clearing their throats, the most spray was found. In patients very weak, speaking only in a whisper, scarcely any spray collected on the slide, and this seldom contained any bacilli. Men wearing heavy mustaches ejected no spray on the slide until after the mustache was held from falling over the mouth. Coughing with the mouth open must necessarily favor the production of the spray. The detection of the bacilli in these fine droplets of the spray was greatly facilitated by the use of a low-power lens for the purpose of locating such droplets; after which a one-twelfth oil-immersion lens was used. Droplets not perceptible to the naked eye were often found in this manner, and such particles not infrequently contained tubercle bacilli, and at times in great numbers.

*Hygiene.*—The above detailed observations prove conclusively that persons suffering from consumption are constantly contaminating the air about them with tubercle bacilli, which are perpetually emitted in connection with this spray. This spray may remain floating in the air of a room for hours, and may alight on the furniture, carpets, etc., but whenever agitated it rises from such articles in the form of dust, again polluting the air of the room. Persons entering the room of a consumptive must, therefore, take into their lungs with each inspiration a variable number of tubercle bacilli, depending entirely upon the degree of contamination of the air in that room. If the person breathes with the mouth open the bacilli may enter the throat and be swallowed. In this manner infection takes place through the alimentary tract. The taking of food is liable to excite coughing in consumptives, and for this reason it is indiscreet for healthy persons to dine at the same table with them, for the spray collects on the food to be eaten by all.

Since tuberculosis is a disease so common amongst cooks and bakers, I am inclined to believe that much of our bread and pastry is polluted in this manner; but fortunately for us, these foods are later heated to a degree sufficient to kill the tubercle bacilli.

In the light of our present knowledge it appears reasonable to presume that most cases of "so-called" inherited tuberculosis develop in persons who contracted the disease by constant exposure to the bacilli in this manner while the diseased parent was living. Such infection is usually combated by the child and held in abeyance until during later life, when, from some cause or other, the general vitality is reduced and this previously inert nucleus of infection is permitted to develop with flaming rapidity.

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## LIQUID SOAPS FOR SURGICAL AND TOILET PURPOSES.

BY M. I. WILBERT,

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Fashions change! This truism holds good even with medicines and medicinal preparations. About two years ago we reported through the *AMERICAN JOURNAL OF PHARMACY* a number of formulas for preparations of soap. Among these was one for a liquid antiseptic soap that had been in use at the German Hospital for several years, as a substitute for antiseptic cake soaps in the operating-room, and was also used in place of the ordinary green or soft-soap in preparing the patient for operation.

But as a thing is good only so long as there is nothing better to take its place, we found that the popularity of our antiseptic soap had been suddenly eclipsed by the supposed advantages of a commercial liquid soap that had been purchased for trial and comparison.

One of the apparent advantages, and probably the greatest, was the fact that a copious lather was readily produced, with very little exertion; this, it was thought, would facilitate the removal of dirt and microorganisms by mechanical means, the theory being that the particles of dirt would be picked up by the foaming bubbles of soap and carried away from their natural lodging-places; enveloped in the resulting mass of lather, they would readily be washed away in the subsequent rinsing in clear water.

The new soap was also distinctly alkaline. This was thought to be an advantage in loosening or liberating the dead epithelial cells, and

thus facilitate, not alone their removal but also the removal of any microorganisms that may have found shelter under or along their edges.

Theoretically this soap was very good, and practically it did all that was claimed for it. The free alkali that was present, while strong, did not appear to be particularly injurious, and the soap could be used repeatedly without any material injury to the skin.

The great objection, from our point of view, was the price; and while it was not to be expected that the manufacturers of such an article would devise a formula and spend large sums of money advertising the finished product without expecting some very material returns in the shape of profit, nevertheless, we felt that we had the right to get together something that would answer our purpose as well, at less cost.

The formula that we finally determined on is a solution of a soda soap in dilute alcohol. Probably the only advantage that soda would have to offer in place of potash is the saving in price—soda being about 50 per cent. stronger as an alkali, and costing, pound for pound, about half as much.

The formula now used is as follows:

Cottonseed oil . . . . .	300
Alcohol . . . . .	300
Water . . . . .	325
Sodium hydrate . . . . .	45
Potassium carbonate . . . . .	10
Ether . . . . .	15
Carbolic acid . . . . .	25

The necessary technic of the formula is very simple. To the oil contained in a bottle of sufficient size, add 100 c.c. of water and 200 c.c. of alcohol; add the sodium hydrate and shake, or stir occasionally until saponification has taken place, then add the remaining portions of the alcohol, and the potassium carbonate dissolved in the water; lastly, add the carbolic acid and the ether and mix or shake well.

Keep in well-corked vials to prevent evaporation of the alcohol. It is advisable to keep the soap at a temperature not below 10° or 12° C., so as to prevent solidification, although this does no permanent harm, as the soap will liquefy again if placed in a warm place for an hour or more. The soap obtained by this process is a light yellow liquid, with a not unpleasant ethereal odor, and a distinctly

alkaline reaction. A few drops poured in the palm of the hand, after previous wetting, will give, with very slight rubbing, a copious lather that stands up well for a considerable length of time.

Its advantage, in surgical practice particularly, depends on its detergent action. The theory of this detergent action was mentioned above, and we need not repeat it here.

For washing instruments after an operation, the use of liquid soap is more economical and requires less work than the ordinary hard or sand-soap, and has the great additional advantage, over the latter especially, that it does not injure the soft plating on the handles of the instruments, nor would it effect the cutting edges of the knives and scissors as would the gritty particles of sand.

Besides the advantages that such a preparation has for the needs of the surgeon and physician, as a cleansing agent and antiseptic, a modification of the same formula has uses that are entirely foreign to those at the bedside or the operating room.

Using the same formula, but omitting the ether and carbolic acid, and substituting for them a few drops of an essential oil, like oil of rose geranium or oil of bergamot, we will have an excellent substitute for cake toilet soaps that are so extensively used at the present time. This aromatic soap solution has advantages in various directions. To facilitate the production of a copious lather in washing it has no equal; as a substitute for shaving soaps or shaving creams, it should fill a proverbial long-felt want. All that is necessary is to place a few drops of the liquid soap in a shaving mug, wet the brush with water and agitate, or stir it about with the soap; in the course of but a few seconds we will have a copious and permanent lather that answers our purpose very well.

As a detergent for shampooing it is excellent, for the same reasons that it answers as a shaving soap. A small quantity of the soap makes a copious lather that removes and retains dandruff as well as the grease and dirt that usually accumulates on the hair and scalp.

In cases where more than one person uses, or is expected to use the same soap, as in public lavatories, there is always more or less danger of transmitting various loathsome and more or less disagreeable skin diseases from one to the other. This danger could be entirely overcome by using a liquid soap, protected as this would be by a glass vial. In addition to its being protected from contact



contamination, this soap is also protected from any possible contamination by means of dirt or organisms floating about in the air.

Aside from this possible use as a toilet article, this soap can also be used to advantage at the prescription counter. You all know how difficult and sometimes disagreeable it is to wash a graduate or bottle in which we have had a fixed oil or resinous material. With the aid of a few drops of this soap it should become a pleasure, as the copious lather that is readily produced takes up and retains the particles of oil and allows the graduate or bottle to be cleansed with a minimum of labor. Another use is in washing the hands after handling odorous, or highly colored substances; but a practical trial is worth more than pages of advice, so let me suggest to you—try it for yourself.

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## FLUID EXTRACT OF NUX VOMICA.

BY FERDINAND A. SIEKER.

The U. S. Pharmacopœia of 1890 directs the extract of nux vomica to be deprived of oil with ether. The fluid extract is directed to be prepared by exhausting the powdered drug with a menstruum consisting of alcohol, water and acetic acid, but no directions are given for depriving this preparation of oil. The fluid extract when thus prepared becomes turbid after standing for some time, owing to the separation of a little oil. Ordinary filtration does not remedy this defect, because all of the oil cannot be separated in this manner.

About one year ago the writer published<sup>1</sup> a method for separating the oil from the powdered extract of nux vomica by means of paraffin. The same method has recently been applied to the fluid extract. An attempt was first made to separate the oil direct from the fluid extract by warming it to the melting point of the paraffin, agitating and allowing it to cool, but the result was not satisfactory. Experiments made with a number of other fluid extracts have shown that oil cannot be directly extracted with paraffin from an alcoholic or hydro-alcoholic solvent.

In the next experiment the aqueous solution of extract which resulted after recovering the alcohol from the percolate of the drug was warmed and treated with paraffin. The details of the process are as follows:

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<sup>1</sup> Pharmaceutical Review, Vol. 19, No. 2, 1901.

One thousand parts of ground drug were practically exhausted by percolation with the U. S. P. menstruum for fluid extract of *nux vomica*, the alcohol was recovered by distillation and the residue diluted with water to 500 parts. Forty parts of paraffin were added and the mixture heated to 70 or 80° C. and briskly stirred for half an hour. It was then set aside for twenty-four hours in a place where it cooled slowly so that the paraffin had a chance to rise to the top before congealing. The congealed paraffin and what it carried with it was separated and the aqueous liquid was then treated in the same manner with thirty parts of paraffin. The paraffin, etc., that was separated was warmed and stirred with sixty parts of water acidulated with acetic acid and then set aside to cool, when the liquid was separated and added to the more concentrated solution of extract. The mixed solutions were strained through a closely woven but comparatively thin muslin. The aqueous solution was carefully evaporated to about 400 parts and the percentage of extractive determined by drying 10 grammes at 100° C. The amount of extractive was deducted from the total weight of the solution, which gave the amount of water present. For every 1000 grammes of water present in the solution 3000 c.c. of alcohol was added. The percentage of total alkaloids was then determined and the preparation diluted with a mixture consisting of one volume of water and three volumes of alcohol until 100 c.c. represented 1.5 gramme of total alkaloids.

After settling, a perfectly clear fluid extract resulted. Its odor was not as disagreeable as when prepared in the ordinary way. A tincture prepared from it had a pale color in comparison with a tincture prepared from the powdered extract. This tincture which was first clear soon became turbid, but after standing for a few days became perfectly bright except for a little sediment.

Twenty-five cubic-centimeters of the fluid extract was evaporated, the extract dissolved in water acidulated with sulphuric acid, and then shaken with benzine and later with ether. The benzine removed 0.0130 gramme or 0.052 of 1 per cent. of fat. The ether removed 0.0230 gramme or 0.092 of 1 per cent. of resin.

LABORATORY OF LEHN & FINK, NEW YORK.

## ADULTERATION OF DRUGS AND FOOD PRODUCTS.<sup>1</sup>

By ALBERT ROBIN, M.D.,

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There is hardly a subject of such vital importance, so far-reaching in its effects on our health and pocket-books, so much in need of careful consideration and yet so little considered, as the one before us. Occasionally we see a startling statement made by some of our newspapers; at times we hear of an adulteration-law enacted by a wise State, but on the whole there prevails a general indifference, which implies only one thing, namely, the desire of the people, and the most intelligent among them, to be, as Wiley forcibly puts it, "cheated, fooled, bamboozled, cajoled, deceived, pettifogged, hypnotized, manicured and chiropodized." How else would you explain the seeming anomaly in the fact that a few unscrupulous men produce and sell to the unsuspecting consumer stuff which we would not give to our dogs for fear of making them either sick or feeble? And this is done in a country with an average of general education superior to any other in the world. What becomes of the knowledge of physiology imbibed at the expense of great effort at our public schools? Were not we taught that sand and terra alba are indigestible, not being acted upon by the juices of the stomach or intestines? that alum, copper, lead and other minerals are not food-stuffs, to say the least? Suppose we give a schoolboy the following problem: If you pay for half a pound of coffee 10 cents, how much do you pay for one pound? Why, 20 cents, of course, answers the smart Johnny. But John pays 20 cents for a pound-package of coffee containing only half a pound of the genuine bean and the rest chicory, grains of corn, wheat, rye, roots and seeds of dandelion, mangel wurzel, turnips, beans, peas—any or all of them—and fully believes that he is getting a *pound* of coffee for 20 cents, and that the manufacturer is in business for his health, while he, John, reaps the benefit of this health-measure. What becomes of the common sense and sound judgment of the usually alert and intelligent John? Suppose he reasons thus: "Do we ever get anything for nothing? or is the manufacturer of the coffee I buy at such a low price a

<sup>1</sup>Address delivered at the last Annual Meeting of the Delaware Pharmaceutical Association, and read by invitation at the Philadelphia College of Pharmacy Pharmaceutical Meeting, February 18, 1902.

philanthropist? How does it come that it is so cheap? Evidently, there is something in my coffee which increases the bulk and thus cheapens the product. Why is the maple syrup I buy so extraordinarily cheap? Evidently, there is not much maple syrup in it." You are right, John, the maple syrup you buy at the bargain counter is composed entirely of cane-sugar and starch flavored with extract of hickory bark. Your jellies have never inhaled the flavor of the natural fruit from which they are claimed to be made; your honey has never been manufactured by the industrious bee; your "pure refined lard" is but a mixture of lard stearine and cottonseed oil; in short, a great deal you eat and drink is altogether different from what it is claimed to be and what you buy it for. As a witty poet, quoted by Wiley, puts it:

"Placid I am, content, serene.  
I take my slab of gypsum bread,  
And chunks of oleomargarine  
Upon its tasteless sides I spread.  
The egg I eat was never laid  
By any cackling, feathered hen;  
But from the Lord knows what, 'tis made  
In Newark by unfeathered men.  
I wash my simple breakfast down  
With fragrant chickory so cheap,  
Or with the best black tea in town—  
Dried willow leaves—I calmly sleep."

Even a "guarantee" on the label is no assurance of purity of the product, as the following case illustrates:

The "Boston Baking Powder" is put up in cans having on the bottom the following label: "All grocers are authorized to guarantee bread, cake, pastry, and all other products made wherein our powder is used free from alum, lime, ammonia, terra alba, rochelle salts or anything injurious as a result of its use." "As a matter of fact," remarks the analyst of the Massachusetts State Board of Health (31 Annual Report) "this brand of powder contains alum, calcium sulphate (terra alba) and ammonia. The label is somewhat ingenious, for it will be noticed that grocers are not authorized to guarantee the *powder* to be free from these products, but what they do guarantee is that *bread, cake* and *pastry* made from this powder are free therefrom. This statement is partially true in that the alum present in the baking powder ceases to be alum when found in the bread, having been transformed into

aluminium hydrate, and . . . the ammonia is driven off by the process of baking."

Time will not permit me to enter into details about the various sophistications of foods and food products. The following list from Battershall will give you an adequate idea of the *common* adulterations. As to the *uncommon* adulterants, they include such palatable substances as sawdust, horseliver, oak bark, colored earths, factory sweepings, brick-dust, and numerous others which the ingenuity of the manufacturer suggests, and which baffle all efforts at detection, owing to their uncommonness.

The *regular* list, then, includes:

Bakers' chemicals . . . . .	{ Starch, Alum.
Bread and flour . . . . .	{ Other meals, Alum.
Butter . . . . .	{ Water, Coloring matter, Oleomargarine and other fats.
Canned foods . . . . .	{ Metallic poisons.
Cheese . . . . .	{ Lard, Oleomargarine, Cottonseed oil, Metallic salts.
Cocoa and chocolate . . . . .	{ Sugar, Starch, Flour.
Coffee . . . . .	{ Chickory, Peas, Rye, Corn, Coloring matter.
Confectionery . . . . .	{ Starch-sugar, Starch, Artificial essences, Poisonous pigments, Terra alba, Plaster-of-Paris.
Honey . . . . .	{ Glucose syrup, Cane-sugar.
Malt liquors . . . . .	{ Artificial glucose, Bitters, Sodium bicarbonate, Salt.
Milk . . . . .	{ Water, Removal of fat.

Mustard . . . . .	{	Flour, Turmeric, Cayenne pepper.
Olive oil . . . . .	{	Cottonseed oil, Other oils.
Pepper . . . . .		Various ground meals.
Pickles . . . . .		Salts of copper.
Spices . . . . .	{	Pepper dust, Starch, Flour.
Spirits . . . . .	{	Water, Fusel-oil, Aromatic ether, Burnt sugar.
Sugar . . . . .		Starch-sugar.
Tea . . . . .	{	Exhausted tea-leaves, Foreign leaves, Indigo, Prussian blue, Gypsum, Soapstone, Sand.
Vinegar . . . . .	{	Water, Sulphuric acid.
Wine . . . . .	{	Water, Spirits, Coal-tar and vegetable colors, Factitious imitations.

Truly, a list to suit the most capricious taste. It almost seems that after consuming such food one could go on sword-swallowing with impunity.

In a recent report of the Illinois State Food Commission (1899-1900) we find the following table of adulterations detected during the year :

Article of Food.	Number Analyzed.	Number Adulterated.
Baking powder . . . . .	44	44
Butter . . . . .	49	36
Catsup . . . . .	47	45
Cider (apple) . . . . .	3	1
Cider (orange) . . . . .	1	1
Coffee . . . . .	15	0
Condensed milk (bulk) . . . . .	4	1
Condensed milk (caus) . . . . .	22	4
Cream of tartar . . . . .	11	2
Honey . . . . .	22	9
Jellies, jams, etc. . . . .	13	9

Lemon extracts . . . . .	34	27
Milk . . . . .	29	5
Olive oil . . . . .	25	13
Sugar (granulated) . . . . .	1	1
Vanilla extract . . . . .	26	20
Vinegar . . . . .	360	192
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Total . . . . .	712	412

Of 61 samples of milk purchased of milk dealers in the city of Wilmington and examined by the Delaware State Board of Health Laboratory, 39 contained formalin, 12 were skimmed, 3 were watered, 5 were skimmed and watered, and 2 were suspicious.

The superficial observer will probably conclude that adulteration is accidental and irregular; that it depends entirely on the honesty and business integrity of the individual manufacturer. This is far from being the case. Sophistication is an economic factor in the struggle for trade. Cheaper products are demanded by the poor and cheaper products are supplied; but as the only way to cheapen them is to sophisticate, adulteration is practised as a bona fide business measure. As a result, we have fraud reduced to a system; fraud not regulated by conscience or principles; fraud from which the otherwise honest man does not shrink, but, nevertheless, fraud which robs the poor man of the money he earns by the sweat of his brow.

This fact has been clearly brought out by the Senate Committee appointed to investigate the extent and nature of adulteration of foods (Senate Report, Vol. 3, No. 516). "The adulteration of prepared or manufactured foods," says the committee, "is very extensively practised, and in many cases to the great discredit of our manufacturers. It is only fair to say, however, that a large proportion of the American manufacturers who are engaged in adulterating food-products do so in order to meet competition, and it is the expression of those gentlemen to say, 'We would be glad to get out of the business of adulterating. We would like to quit putting this stuff in coffee, and would be willing to brand our syrups for what they are, but our competitors get a trade advantage which we cannot surrender.'"

This position, however, cannot be maintained with regard to drugs. Here, evidently, the price to the consumer does not enter into consideration, the prices being, as they mostly are, altogether

out of proportion to the original cost. Neither does competition, in so far as the retail price of the drugs is concerned, compel the druggist to reduce the cost which may be said to be fairly uniform with a liberal margin for wholesale fluctuations.

Adulterations of drugs, therefore, is nothing less than an abominable fraud which ought to put to shame any self-respecting man practising it. This fraud, like a double-edged sword, cuts in two directions: (1) By it money is obtained under false pretense, alike from rich and poor, an offence which in other walks of life is punished by law; and (2) human life or health is frequently placed at stake for the gain of a few paltry dollars. There is still a third aspect to this evil: It retards the progress of materia medica in the proportion as the physician fails to achieve the desired effect, and, not suspecting the genuineness of the drug he uses, does not believe in its virtues. The reason for the sophistication of drugs is to be sought in the cloak of mystery with which medicine has been wrapped up from time immemorial. The sick know naught of the drugs they are made to take, nor do they care to know. Medicine to them is still a black art, and what they want is charms, being altogether indifferent as to whether these are made of scraps of paper, worthless herbs or roots or plain sugar. The physician, on the other hand, has been in the past so deeply entangled in the web of polypharmacy that one or two worthless or adulterated drugs made little difference among two or three dozen others. His was truly a shotgun prescription: if one shot missed the mark the others might hit it. From these dark ages of polypharmacy the physician emerged into the fruitless age of proprietary medicine, an age so remarkably barren of results and so inimical to scientific progress! In the proprietary medicine we have the same shotgun, only the loading is done by somebody else, the physician pulling the trigger. He even does not know how many shots are in the barrel or what they are made of. What does "eudoria" stand for? For nothing. All we know is that it is a wonderful combination of remedies, possessing extraordinary virtues not to be found in any of the drugs mentioned in the Pharmacopœia or the National Formulary. This remarkable panacea stops diarrhea and moves the bowels, relieves pain, cures headache, dizziness, dropsy, influenza, rheumatism and all other ills human flesh is heir to. "Doctor," proclaims the illustrious inventor of the miraculous panacea, "why bother



your head about the thousand and one drugs of your *materia medica*? Why be troubled about their composition, properties, physiological effects and incompatibilities when 'eudoria' does it all, and all you need remember is the name? Of course, you will be particular to specify 'The Fraud Pharmacal Company,' for, you see, there are worthless substitutes on the market." And the wise physician goes on using "eudoria." His patients get well with or in spite of it, and by the end of his professional life he finds in his mind a blank with the meaningless word "eudoria" inscribed on it. Under these circumstances we can well understand why sophistication of drugs is so universally practised. Fortunately, the medical profession is gradually recovering from the mental stupor into which it was thrown by the "Fraud Pharmacal Co." and the like. The Pharmacopœia is taken off the dusty shelves and carefully looked over; the *materia medica* is again looked into inquiringly; the physician no longer "puts a drug of which he knows little into a stomach of which he knows less." The dawn of scientific medicine is upon us and, *pari passu*, the searchlight of rigid inquiry is thrown upon the composition of drugs and their adulterations. What is revealed will be seen from the few facts which time and space allow me to mention—it would require a volume to cite them all.

Before I take up the various sophistications commonly practised I will quote Hassal's definition of adulteration: "It consists in the intentional addition to an article, for the purpose of gain or deception, of any substance or substances the presence of which is not acknowledged in the name under which the article is sold." This definition is somewhat incomplete, for it does not include the substitution of an article of an inferior quality. Thus we find that in the case of vegetable drugs, herbs of inferior quality are sold, although there is no actual addition of substances different in name or appearance from the one asked for. In looking over the reports of the several State Boards of Health which have investigated the subject, we find<sup>1</sup> that cinchona has been found very variable in quality; that a large quantity of poor bark has been frequently on the market; that worthless bark has been often offered for true calissaya and red bark. Wild cherry has been seldom of prime

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<sup>1</sup> Supplement 6, National Board of Health Bulletin.

quality, being frequently adulterated with sassafras bark. *Belladonna* is often of bad quality, having become deteriorated. *Hyoscyamus* has been found to contain 8 per cent. of impurities, such as bay leaves, straw, feathers, oak, stone, branches from unknown plants, etc. *Aconite* is often moldy, partially or entirely exhausted and redried. *Sarsaparilla* is adulterated with clay, foreign roots and dirt. The following admixtures were actually found in some samples: Nut galls, mastic stems, bay, belladonna and digitalis leaves, paper, bark, straw, ipecac and may-apple. *Copaiba* has been found to contain 6 to 8 per cent. of fat oil. There is also a factitious copaiba composed of linseed oil, castor oil, turpentine and sufficient copaiba to give odor. *Opium* has been found to contain 20 per cent. of foreign matter, chiefly lead. Clay, wax, cherry gum, extract of licorice and fused colophony have been detected in the gum, while occasionally the entire gum is composed of clay and cow's dung. The powdered drug is frequently adulterated to the extent of 50 per cent., starch being the usual adulterant. *Ginger* is adulterated with lime. *Hydrastis* with beet-root, serpentaria, cypripedium, sanguinaria, may-apple. Powdered *rhubarb* with turmeric. Powdered *capsicum* with red lead, vermilion, venitian red, brick-dust, ground rice, turmeric, mustard husks, cornstarch, wheat and horseradish. *Mustard* with cornstarch, potato starch, turmeric and capsicum. *Asafetida*, with stone, sand, and other foreign substances. *Gum arabic*, with marble-dust, sand, dextrin. *Castor-oil*, with whale oil, lard oil and croton oil. *Olive oil*, with paraffin oils, cottonseed oil, oil of benne, nut oil. *Sulphur*, with gypsum (50 per cent.), sulphate of calcium. *Tartaric acid*, with sulphate of sodium and alum. *Ammonium carbonate* has been found to be made from ammonia, glue and bicarbonate of soda. *Subnitrate of bismuth* often contains phosphate of calcium; *calcium carbonate*, burnt bones; *iron by hydrogen*, charcoal; *bichloride of mercury*, common salt; *bitartrate of potash*, calcium carbonate, farinaceous matter, calcium sulphate, cornstarch; *potassium iodide*, bromide of potash.

It may be remarked that by purchasing the drugs from reliable firms, the above-mentioned adulterations are not likely to be found. This is no doubt true, but unfortunately, druggists are often tempted by the low prices at which drugs are offered by some unscrupulous wholesalers. That this is frequently the case we gather from the fact that samples purchased from various druggists at random do

show either adulterations or inferior quality. Thus, in a recent report of the New York State Board of Health we find that the following drugs were found adulterated:

Name of Drug.	No. of Samples Analyzed.	No. Found Adulterated.
Seneca root . . . . .	23	5
Virginia snake root . . . . .	21	1
Sarsaparilla root . . . . .	23	14
Digitalis leaves . . . . .	22	10 (deteriorated)
Spanish saffron . . . . .	20	17
Myrrh . . . . .	21	6
White wax . . . . .	17	6
Oil of cocoa . . . . .	19	6
Quince seeds . . . . .	13	7
Lupulin . . . . .	18	7
Arrow root . . . . .	20	8
Ipecac, powdered . . . . .	22	10
Jalap " . . . . .	22	8
Orris " . . . . .	19	9
Rhubarb " . . . . .	23	6
Mustard " . . . . .	24	12

During a single year the Massachusetts State Board of Health detected the following adulterated drugs:

Acidum tannicum: Ten samples examined; five found to contain resin or foreign gums.

Æther: Two samples examined; both contained too much alcohol.

Aqua ammonia fortior: One sample; too weak.

Bismuth subnitrate: Ten samples analyzed; five contained carbonate.

Calx chlorata: All of the samples analyzed found below standard.<sup>1</sup>

Diabetic flour: Thirteen samples analyzed; only three, the product of one manufacturer, were found free from starch.

Extractum glycyrrhiza: Nine samples examined; all found to contain cornstarch.

<sup>1</sup>A number of samples analyzed by the Delaware State Board of Health Laboratory contained only from 5 to 12 per cent. of available chlorin.

Ferri et quiniæ citras: Eight samples examined; two contained insufficient quinine.

Glycerin: Twenty-nine samples examined for arsenic; twenty were found to contain from traces to 0.002 in 25 grammes of sample.

Limonis succus: Twelve samples analyzed; all adulterated or impure.

Oil of lemon: Six samples analyzed; five contained oil of turpentine.

Olive oil: Fifty samples examined; thirteen consisted wholly or in part of cottonseed oil.

Potassium bitartras: Of twenty-one samples, two were adulterated with cornstarch, gypsum and acid phosphate of lime.

Sulphur præcipitatum: Of fifteen samples, ten contained calcium sulphate.

Tr. Opii: Of thirty-nine samples, thirty-four were found below the standard.

The last, of course, indicates that the crude opium from which the tincture was made, was not of standard strength.

During the fifteen years, from 1883 to 1897, the Massachusetts State Board of Health examined a large number of samples of drugs with the following results:

Year.	No. of Samples Analyzed.	No. Found Adulterated.	Percentage.
1883 . . . . .	603	246	40.8
1884 . . . . .	682	251	36.8
1885 . . . . .	1,007	436	43.3
1886 . . . . .	888	425	47.8
1887 . . . . .	550	150	27.3
1888 . . . . .	862	228	26.4
1889 . . . . .	600	97	16.2
1890 . . . . .	400	75	18.7
1891 . . . . .	424	72	17.0
1892 . . . . .	487	175	35.9
1893 . . . . .	327	99	30.3
1894 . . . . .	487	103	33.5
1895 . . . . .	544	332	61.0
1896 . . . . .	565	254	50.3
1897 . . . . .	8,366	3,303	35.9

Thus we have an average of adulteration of 34.74 per cent. This is in a State which enjoys a pure food and drug law well conceived and admirably executed. What takes place in the States less fortunate you can well imagine. In our own State of Delaware, Professor Penny, the chemist of the Delaware College Agricultural Experiment Station, while analyzing a patent medicine for the cure of hog cholera, made the startling discovery that powdered antimony, which was supposed to enter into the composition of this "cure" (copied bodily from a formula published by the Bureau of Animal Industry), as well as samples labeled "antimony sulphide," in the possession of the station, contained no antimony at all. He then obtained samples of antimony from various druggists of Wilmington and other parts of the State, as well as New York, Pennsylvania, New England and the Southern States. The result was that out of forty-one samples sold by the general retail drug trade, only seven were found to be unadulterated commercial antimony sulphide; one contained a small quantity of the salt mixed with coal dust, and thirty-three were entirely free from antimony in any form. Those examined more completely were mixtures of carbon, as coal dust, sometimes a little charcoal or graphite, with chalk and sand. Subsequent to this experience the Experiment Station of Nebraska published the account of a similar experience. Pretty hard on the hog (or the owner)! Professor Penny also analyzed, by request of Dr. Black, a number of samples of gluten bread for diabetics, claimed to be free from starch. The latter, however, was found in every sample in the proportion of 50 to 75 per cent.

There is still another form of sophistication, and that is in the sale of worthless remedies proclaimed to possess marked therapeutic virtues. Many of the so-called proprietary remedies belong to this class. Even remedies, the approximate composition of which is stated, and which are purported to be an improvement on the U. S. P. or the National Formulary, frequently possess no medicinal virtues. The various preparations of pepsin may be cited as an example. I had occasion to examine a number of samples of the various elixirs and other combinations of pepsin. Several of these proved practically inert when tested by the egg-albumen test. A gentleman, whose authority in the matter I consider unquestionable, writes me that "A good many years ago an eminent chemist and physician stated that he had found by assay wines of pepsin to be practically inert.

"Unfortunately," continues the writer, "the condition of affairs in the applied chemistry of the digestive ferments is such that obviously incompatible and inert preparations are persistently offered, the peculiar physiological nature and relations of these ferments being either ignored, or not at all well understood. If you take up the diastasic enzyme, for instance, you will find products which are represented to contain diastase and 'ptyalin' in solution with other ferments, to be devoid of starch-converting power. Elixirs of 'pepsin and bismuth' are quite generally manufactured and used, and are even found in 'formularies,' whilst the fact remains that bismuth in solution destroys pepsin, that no permanent solution (elixir or other) can be made which contains pepsin in conjunction with ammonio-citrate of bismuth in any form in which it is commonly used in these prescriptions." In the case of manufactured drugs, such as fluid extracts, pills, tablets, etc., we find that, through no fault of the manufacturer, the drug or combination of drugs deteriorates in time and becomes either deficient in its physiologic activity or entirely worthless. Organic matter, especially alkaloids, are bound to deteriorate on keeping, and even if no visible changes take place, owing to some special form of preservation, certain intrinsic changes undoubtedly do occur. Is there any one here who will affirm that a preserved pear or peach tastes exactly like the fresh fruit? Every one of you has observed the changes, even visible to the naked eye, which take place in your fluid extracts and tinctures. As to pills and tablets, they are often mere mummies of the original drug. They have been driven through boards and passed uninjured the alimentary tract, and I am sure that many of them bear the same relation to the fresh drug as the Indian mummy at the Washington Museum does to the original Indian. "A ready-made pill—to coin a new definition—is a powdered drug embalmed in sugar and so coated as to remain impervious. It may be used in time of war instead of bullets." Many of the official pills have been found deficient in alkaloidal strength. Thus, the New York State Board of Health found that quinine pills, stated to contain 2 grains, only had 1.7, 0.9, 1.3, 1.6, 1.8; 3-grain pills showed 2.25, 1.7, 2.7, 2.5; 5 grains 3.4, 4.4, 4.5 and 2.4.

My paper will not be complete without mentioning still another form of sophistication which is really a simple fraud. I allude to patent medicines. I may state, without fear of contradiction, that

patent medicines are one of the greatest evils this country is afflicted with. They demoralize the people by engendering a constant dread of disease, so-called, pathophobia. They are responsible for the pernicious system of self-medication for imaginary or real ills; they frequently ruin health and jeopardize life; they divide the people at large into two classes: a larger one, composed of fools, and a smaller, made up of sharps who live by their wits at the expense of the fools—in short, the patent-medicine vender is nothing but a parasite of the worst kind, and the welfare of the social organism depends solely on the absence or presence of parasitic growths. Here are a few facts which could be multiplied *ad infinitum* did time permit: A package of "kaskine," a much-vaunted remedy, sold at \$1 an ounce, was found by the Massachusetts Board of Health to consist of nothing more or less than granulated sugar. A package of malt tablets, for the cure of dyspepsia, was found to be simply sugar lozenges colored by ferric oxide. A sample of "go to sleep" was found to consist essentially of sulphonal, a drug to be used only by the recommendation and under the supervision of a physician. Besides being poisonous, its continuous use defeats the very purpose for which it is intended. Hypnotics, as a rule, are dangerous when used indiscriminately by the laity. A sample of so-called "Boston drug," for the cure of drunkenness, consisted essentially of milk sugar, 9 parts, and ammonium chloride, 1 part. "Quince lotion" was found to contain borax and oil of bergamot (borax, as you well know, is the *synonym* for quince seed). Many of the patent medicines, however, are not harmless frauds but dangerous missiles. It is as though a highway robber extorted your money and then sent a bullet into your head as an expression of gratitude. Thus a "skin success ointment" was found to be composed of red oxide of mercury. Most of the face lotions contain enormous quantities of corrosive sublimate, 8 grs. per ounce having been found in one sample and 14.7 grs. per ounce in another (Mrs. McCorrison's Famous Diamond Face Lotion). All of the vaunted sarsaparillas, the innocent purifiers of the simpleton's blood, contain iodide of potash in large proportions. Church's was found to contain 2.25 per cent.; Leavitt's, 2.17 per cent.; Myrick's, 2.12 per cent.; Mattison's, 2 per cent.; Dana's, 1.17 per cent., and so on through the entire list, down to 0.32 per cent. (Hood's contains 0.75 per cent.). "The sale of such an article," says the Report of the Massachusetts

Board of Health of 1892, "in unlimited quantities by druggists, grocers and others is censurable. More than this, the method of its sale is dishonest, since the unwary purchaser is led to believe that he is purchasing a harmless vegetable remedy, namely, sarsaparilla. It may be seriously questioned whether the blood of persons who take iodide of potassium continuously is not decidedly impoverished, instead of being purified, as is claimed by the manufacturers. It is not uncommon to find persons who have used continuously, six, eight, or ten pint-bottles of one of these preparations. . . . The pale, sallow complexion of the habitual user of the 'sarsaparilla iodides' is, unfortunately, too often met with, wherever these remedies are freely advertised and sold." Most, if not all, of the cold cures contain cocaine in considerable quantities, and many a case of cocaine habit may be laid to the doors of the manufacturers of these panaceas. Of course, you will not wonder that all the opium cures contain morphine, for their success is certainly marvelous. Why take opium, with all the disadvantages and difficulties connected with its purchase, when one can buy something just as good (whatever that may be) in the shape of an "opium cure." The so-called Keeley's Double Chloride of Gold Cure was found to contain not a trace of gold (it is too expensive!). Nor will it surprise you to learn that many tonics, "recommended especially for the inebriates," contain alcohol in large amounts. Such an one is Parker's Tonic, "purely vegetable," which was found to contain 41.6 per cent. of alcohol by volume. Another is Whiskol, "a non-intoxicating stimulant, whisky without its sting," containing 28.2 per cent.; and Colden's Liquid Beef Tonic, "recommended for treatment of alcohol habit," 26.5 per cent. It may also be comforting to our total abstainers and to the many reverend gentlemen, whose flourishing signatures are to be found appended to very laudatory testimonials, to learn that the sixty-one samples of the more widely used tonics examined by the Massachusetts Board of Health contained alcohol in various proportions. I will cite only a few of the more prominent:

	Alcohol, Per cent.
Liebig Company's Cocoa Beef Tonic . . . . .	23.2
Schenck's Seaweed Tonic, "entirely harmless" . . . . .	19.5
Atwood's Quinine Tonic Bitters . . . . .	29.0
Baker's Stomach Bitters . . . . .	42.6
Burdock Blood Bitters . . . . .	25.2



Copp's White Mountain Bitters, "not an alcoholic beverage" . . .	6'0
(It should be noticed that this "tonic" contains more alcohol than the strongest beer.)	
Drake's Plantation Bitters . . . . .	33'2
Green's Nervura . . . . .	17'2
Hooftand's German Bitters, "entirely vegetable and free from alcoholic stimulant" . . . . .	25'6
Hostetter's Stomach Bitters . . . . .	44'3
Kaufmann's Sulphur Bitters, "contains no alcohol" . . . . .	20'5
(As a matter of fact no sulphur was found in this preparation.)	
Paine's Celery Compound . . . . .	21'0
Walker's Vinegar Bitters, "contains no spirit" . . . . .	6'1
Warner's Safe Tonic Bitters . . . . .	35'7
Ayer's Sarsaparilla . . . . .	26'2
Hood's " . . . . .	18'8
Dana's " . . . . .	13'5
And so on.	

You will observe that the dose recommended on the labels is from a teaspoonful to a wineglassful from one to four times a day, "increased as needed." What a perversion of justice! Some poor wretch will be sent to the workhouse for selling a little whisky to a few friends, without a license, and men like the "tonic" manufacturers, who sell cheap whisky by the thousands of gallons, go scott-free and accumulate millions from their nefarious business.

That the various "hair tonics" contain dangerous proportions of lead will be somewhat more unpleasant news to our "belles" who improve on nature by those "innocent" remedies, or endeavor to restore their faded charms. Here are a few of them:

Per Cent. of Lead.

Renown Hair Restorer contains . . . . .	1'86
Mrs. Allen's Hair Restorer contains . . . . .	2'30
Hall's Hair Renewer contains . . . . .	1'75
Wood's Hair Restorative contains . . . . .	1'59
King's Vegetable Ambrosia contains . . . . .	1'51
Parker's Hair Balsam contains . . . . .	2'32

That these people are not indicted and prosecuted for wholesale poisoning is a mystery to me! But such is our free country. "What fools ye mortals be."

Now what should be the duty of the druggist in the matter of adulteration? His duty is clear. As a citizen and a consumer he should put forward his best efforts to secure laws which would at least punish, if not prevent, wholesale fraud. As to drugs, he is evidently to be on the offensive rather than the defensive. His

training in the pharmaceutical college and in the drug store should enable him to recognize the grosser forms of adulterations and impurities and put him on his guard against the imposition of dishonest dealers. The statement is frequently made that the special training which the druggist is compelled to acquire is far above the requirements of his profession; in other words, it is useless. This is far from being the case. Unless the profession of the druggist is understood to be merely that of a tradesman, the training he receives is barely sufficient to meet the requirements. Every druggist should be able to assay his own drugs and detect adulterations and impurities. This is not hard to do if one follows the directions of the Pharmacopœia. "But," I will be asked, "of what use is this when the physicians dispense their own tablets, and all the druggist is called upon to do is to pour out So-and-So's elixir, cordial, or other preparation from a pint into a three-ounce bottle and label it according to the physician's directions? This is unfortunately true, but it is only the druggist's fault. The manufacturers usurped the prescription trade by first catching the eye and ear of the physician and then sending the druggist on a fool's errand to help them gain a firm footing in the physician's office. If the druggists spent one-tenth as much time, money and energy as the manufacturer, there would not be a single pill or tablet in the physician's office, and the old custom of dispensing *freshly* prepared remedies would again be in vogue to the great benefit of both physician and patient. Why not acquaint the doctors of your neighborhood that capsules freshly made from the *dry* powder are superior to pills; that powders are more certain in their action than tablets, and solutions more reliable than either pills or tablets? Why not make use of the information concerning the deterioration of drugs, especially alkaloids, when dried and incorporated with an excipient? Why not send a neatly printed circular to the physicians of your neighborhood, advising them, for instance, of the fact that the New York State Board of Health found quinine pills to be deficient in alkaloidal strength and that, therefore, with their permission, you will dispense capsules which are sure to contain a definite amount of the fresh drug? Why not send to the doctors samples of the various official elixirs which *you* prepared, showing that you can make as elegant preparations as the manufacturers? Why not experiment with the various drugs, the taste or smell of which is objectionable, with a view of render-

ing them palatable, and, having found the desired combination, notify your physicians of the fact and send them a sample? Why not have a label on every bottle or package, stating that the purity of the contents is guaranteed, and be able to stand by your guarantee?

With regard to patent medicine I will, at the risk of laying myself open to criticism, make the following assertion: A druggist who keeps patent medicines countenances a crime, and one who recommends them to the customers without knowing their composition is a party to a crime. It is bad enough to be compelled by the iron rules of trade and competition to handle these at times dangerous concoctions, but when the question is asked by the customer, Do you think Paine's Celery Compound is good for my nerves? the answer should invariably be, either "I do not know" or, if you do know, that this remedy contains 21 per cent. alcohol. "Mr. Smith, do you think that Mrs. Allen's Hair Restorer will be good for my hair?" "I do not know, madam. All I know is, that it contains 2-30 per cent. of lead, and is therefore dangerous." How are you to know these facts? Simply enough: They are published in the various reports of the boards of health, which have the pure food and drug laws, and in the pharmaceutical journals, and it should be incumbent upon your committee on drug adulterations to collect these data and produce them at your annual meetings. To replace the worthless or dangerous remedies which you cannot recommend, put up some of your own, stating *on the label the exact composition*. Never mind about giving away the secret. You will gain the confidence and respect of your customers, who will rather deal with an honest man than with one who may at any time be accused of being a cheat, without being able to defend himself. Besides, if your remedy is secret, why is it superior to the patent medicines which have "testimonials?"

This, gentlemen, should be your ideal—strive for it, work for it. Take out the education of the public in matters pertaining to drugs from the hands of the unscrupulous patent-medicine vender, and that of the physicians from the hands of the manufacturer. Awaken from the lethargy into which you may have allowed yourself to fall. Make the best of your ability and special preparations, and above all make of yourself an important and useful factor in the life of the community. It remains with you either to remain grocers and confectioners or to raise yourself to the dignity of a pharmaceutical chemist.

THE IDENTIFICATION AND PROPERTIES OF  $\alpha$ - AND  $\beta$ -EUCAINE.<sup>1</sup>

BY CHARLES LATHROP PARSONS.

Two new alkaloids under the names  $\alpha$ -eucaine and  $\beta$ -eucaine have recently been offered to the medical and dental profession for use as a local anesthetic. There is scarcely a reference to either in any strictly chemical journal, but their use and physiological properties have been very fully discussed in medical and pharmaceutical publications. Although they are proprietary drugs, the fact that  $\beta$ -eucaine is so often substituted for cocaine, in dental preparations, hay-fever remedies, and other proprietary medicine, makes it highly desirable that their distinctive properties be carefully studied and that methods be found for their identification and separation from cocaine and other alkaloids. It was owing to the fact that I was called upon to analyze a special dental preparation containing eucaine that my attention was first called to the existence of the alkaloid, and I was greatly handicapped by the silence of chemical literature upon the subject.

$\alpha$ -Eucaine was first obtained by George Merling<sup>2</sup> by synthesis from triacetoneamine through triacetoneamincyanhydrin to triacetonealkamincarbonic acid, which, by the action of benzoyl chloride and subsequent action of methyl iodide in caustic potash solution, becomes *n*-methylbenzoyltetramethyl- $\gamma$ -oxypiperidincarbonic acid methylester or " $\alpha$ -eucaine." This, when treated with hydrochloric acid, acts like other alkaloids forming a hydrochloride, in which form it is prepared and sold.

$\beta$ -Eucaine was discovered by Albrecht Schmidt and George Merling<sup>3</sup> and was obtained by purifying the vinyl diacetonealkamine of Fischer<sup>4</sup> and substituting a benzoyl group for the hydrogen atom of the hydroxyl. Thus " $\beta$ -eucaine" or benzoylvinyldiacetonealkamine, is also an alkaloid which, when treated with hydrochloric acid, forms the hydrochloride.

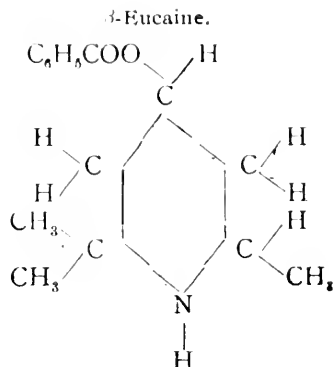
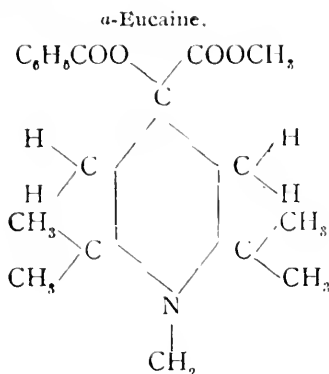
It will be seen from the structural formulas of  $\alpha$ - and  $\beta$ -eucaine that they have a close relation to cocaine and to tropacocaine. It

<sup>1</sup> Read at the Denver meeting of the American Chemical Society, August 29, 1901, and reprinted from the *Jour. Amer. Chem. Soc.*, 1901, p. 885.

<sup>2</sup> *Apoth. Ztg.* (1896), p. 293, 418, 448.

<sup>3</sup> Virchow's *Archives f. path. Anat. und Phys.* (1896), vol. 145.

<sup>4</sup> *Ber. d. chem. Ges.*, 17, 1894.



was this close chemical connection which led to the belief that they would show similar anesthetic properties.

It is not the purpose of this paper to enter into a discussion of the physiological and therapeutic effects of the eucaines, but it is not out of place to state that the chief claims of their superiority over cocaine are that they are far safer to use, that they cause no excitation of the heart's action, that *β*-eucaine, especially, is some four or five times less toxic, that they have equal analgesic power with cocaine, that they do not decompose by boiling, and their hydrochlorides can hence be easily sterilized, and that their solutions will keep for an indefinite time without decomposition. The quite extended use of *β*-eucaine would seem to show that many of these claims have been substantiated. It would be well to add that *α*-eucaine has at times an irritating action or smarting effect of its own before anesthesia sets in, which has rendered its acceptance and use somewhat doubtful. It is claimed that this is absent with *β*-eucaine, or at least is no more often the case than with cocaine. *β*-eucaine is the one that is almost exclusively used, and the firm which manufactures both furnishes only *β*-eucaine when "eucaine" alone is called for. Accordingly, almost all preparations on the market consisting in part of eucaine contain *β*-eucaine hydrochloride, and the question of analysis would generally be a distinction between this salt and cocaine.

To establish means of identification of eucaine, all the well-known reactions of the alkaloids have been tried, and I have endeavored to find new ones applicable to this particular case.

In general the properties of the eucaine alkaloids follow those of

the strychnine group, and especially do they very closely resemble cocaine. The bases themselves are readily soluble in benzene, chloroform, ether, chloroform-ether, petroleum-ether or gasoline, and amyl alcohol. They can be easily extracted from their salts by rendering their solutions in water slightly alkaline with ammonia and shaking out with any of the above solvents. This extraction is, however, most rapidly accomplished with light petroleum distillates or with ether.  $\alpha$ -Eucaïne melts at  $103^{\circ}$ ,  $\beta$ -eucaïne at  $91^{\circ}$ , and cocaine at  $98^{\circ}$ . In following out any scheme of analysis of the alkaloids they will probably always be found where cocaine would be expected, and their identification becomes essentially a separation from each other and cocaine.  $\alpha$ - and  $\beta$ -eucaïne are sold in the form of their hydrochlorides, and it is upon this salt that most of the tests for their identification should be made. As usually prepared,  $\alpha$ - and  $\beta$ -eucaïne hydrochlorides are white powders, identical in appearance. They are, however, easily crystallizable.

$\alpha$ -Eucaïne hydrochloride melts at about  $200^{\circ}$  C. and decomposes at the same time. It is soluble at ordinary temperature in about ten times its weight of water, solubility varying with temperature. It is more soluble in hot water, from which it crystallizes out to an approximately 10 per cent. solution on cooling. It is soluble in about its own weight of alcohol, 10 grammes requiring from 8 to 9 grammes of alcohol for solution. It is but slightly soluble in ether or olive oil, but glycerol dissolves it much the same as water.

$\beta$ -Eucaïne hydrochloride melts at  $268^{\circ}$  C. with decomposition. At ordinary temperatures it is soluble in water to the extent of about 3 per cent., but is more than twice as soluble in hot water, from which most of the excess crystallizes slowly after cooling. Its solubility in alcohol is greater than in water, or about 11 per cent., varying somewhat with the temperature. This comparative insolubility is one of its chief characteristics, especially differing from cocaine hydrochloride, which dissolves in less than its own weight of either water or alcohol. It is almost insoluble in ether or olive oil.

REACTIONS IN WHICH THE HYDROCHLORIDES OF  $\alpha$ -EUCAÏNE,  $\beta$ -EUCAÏNE AND COCAÏNE ACT ALIKE.

Mayer's reagent gives with either  $\alpha$ - or  $\beta$ -eucaïne a light yellowish amorphous precipitate.

Wagner's reagent gives a voluminous reddish brown precipitate even in dilute solutions.

Tannic acid (1 : 10) gives no precipitate or only a very slight transparent flocculency.

Picric acid (1 : 100) yields a fine lemon-yellow precipitate in solutions stronger than 1 per cent., which is soluble in acids, but in dilute solutions yields no precipitate. Even in moderately strong solutions the precipitate formed by the first drop or two of reagent redissolves. The precipitate with *α*-eucaine is more insoluble than either of the others, and comes down, accordingly, in somewhat more dilute solutions.

Iodine in alcohol yields a brown precipitate soluble in excess.

Fröhde's reagent (sulphomolybdic acid) gives no precipitate.

Mercuric chloride (1 : 20) gives no precipitate in dilute solution, but in moderately strong solutions gives a fine white precipitate, easily soluble in excess.

Ferric chloride and potassium ferricyanide mixed give no precipitate except a white one in strong solutions. Allen<sup>1</sup> states that cocaine gives a precipitate of Prussian blue, but I have not been able to obtain it. Ferric chloride is stated by some authors to turn red on boiling one or two drops of a dilute solution with cocaine, owing to the formation of benzoate of iron. But as it also turns red with either of the eucaines or simply with distilled water the reaction is of no value. It gives no precipitate even in strong solution.

Cadmium iodide gives a white precipitate.

Potassium ferrocyanide gives in solution of about 10 per cent. a slight colorless gelatinous precipitate. A saturated solution of *β*-eucaine does not yield this precipitate probably because the solution is too weak.

Potassium ferricyanide gives a white precipitate in moderately strong solutions, which is more easily thrown down if solution is acid with hydrochloric acid.

Potassium bromide, chloride, or bromate give no reaction.

If a few drops of a solution of either of the hydrochlorides of *α*- or *β*-eucaine or cocaine be acidified with strong nitric acid, evaporated to dryness in a watch-glass, and treated with one or two drops of a solution of alcoholic potash, a very characteristic odor of benzoic ethyl ester is obtained. This reaction would probably also be given with other alkaloids containing the benzoyl group.

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<sup>1</sup> "Commercial Organic Analysis," Vol. III, Part II, p. 275.

REACTIONS CHARACTERISTIC OF  *$\alpha$ -EUCAINE SALTS.*

Potassium iodide (1 : 10) gives, in even moderately dilute solutions of  *$\alpha$ -eucaine hydrochloride*, a white silky and glistening precipitate. This precipitate has much the same appearance as the one obtained when stannous chloride is added to a cold dilute solution of mercuric chloride.  *$\beta$ -Eucaine* and cocaine give no reaction.

Ammonia, even in dilute solution, precipitates the bases  *$\alpha$ - or  $\beta$ -eucaine* or cocaine, but  *$\alpha$ -eucaine* is almost insoluble in excess. In 1 per cent. solution the white precipitate is at once thrown down, and in the case of  *$\beta$ -eucaine* or cocaine dissolves immediately on addition of about their own volume of strong ammonia.  *$\alpha$ -Eucaine*, so precipitated, can be diluted at least ten times with strong ammonia without solution. In stronger solutions the difference still exists but is not so easily recognized. A 3 per cent. solution of  *$\beta$ -eucaine* or cocaine requires about five times its own volume of ammonia to be dissolved, and stronger solutions much in proportion to the per cent. present. In other words a strong solution of ammonia will dissolve about one-half of one per cent. of the bases  *$\beta$ -eucaine* or cocaine, while it will dissolve but a very small fraction of a per cent. of  *$\alpha$ -eucaine*. In dilute solutions this is a very characteristic reaction for  *$\alpha$ -eucaine* and strong solutions are, of course, very easily rendered dilute for the test.

Potassium dichromate, in strong solution, added drop by drop to a 0.5 per cent. solution of  *$\alpha$ -eucaine*, begins to throw down a fine lemon-yellow precipitate after addition of one or two drops. The precipitate is then much increased by one or two drops of strong hydrochloric acid, and is then quite insoluble, dissolving only after several times diluting the volume of the solution. With stronger solutions the precipitation takes place at once, the first drop giving a more and more permanent precipitate as the solution grows stronger. The precipitate is notably insoluble in either water or hydrochloric acid. More dilute solutions either show no precipitate or only after addition of hydrochloric acid. Cocaine, 1 per cent. solution, is not precipitated by potassium dichromate, but the addition of one or two drops of concentrated hydrochloric acid throws down a yellow precipitate easily soluble in very slight excess of hydrochloric acid or on dilution of the solution with water. Weaker solutions do not precipitate, while stronger solutions precipitate at once. The precipitate is, however, easily soluble as before.  *$\beta$ -Eu-*



caine acts like cocaine. The precipitate in all cases is lemon-yellow. The  $\alpha$ -eucaïne precipitate is quite crystalline. All three may throw down a small amount of a yellow colloidal precipitate which sticks to the side of the test-tube and dissolves but slowly, although this in no wise interferes with the test, and does not take place if reagents are added slowly. While this test depends upon the very much greater insolubility of the  $\alpha$ -eucaïne salt, the non-precipitation in dilute solutions of a certain strength until after the addition of hydrochloric acid is quite characteristic for all. The correct strength is about 0.5 per cent. solution of  $\alpha$ -eucaïne and about 1 per cent. for  $\beta$ -eucaïne and cocaine. In the case of cocaine and  $\beta$ -eucaïne, the test may be conveniently applied by precipitating a stronger solution than 1 per cent. with potassium dichromate solution, diluting carefully with water until precipitate just dissolves. On addition of a drop of concentrated hydrochloric acid the precipitate will at once re-form. This cannot be done with  $\alpha$ -eucaïne, for precipitate once formed it is difficult to get it to dissolve at all.

Chromic acid (1 : 20) acts similarly to the dichromate.

REACTIONS OF COCAINE DISTINGUISHING IT FROM EITHER  $\alpha$ - OR  $\beta$ -EUCAÏNE OR FROM BOTH.

If a small amount of cocaine hydrochloride be rubbed up with dry mercurous chloride (calomel), and then moistened with alcohol, it rapidly turns to a grayish black.  $\alpha$ -Eucaïne hydrochloride becomes slowly a dark gray.  $\beta$ -Eucaïne hydrochloride is not affected.

Platinic chloride throws down slowly a yellow crystalline precipitate from a 1 per cent. solution of cocaine hydrochloride which is insoluble in hydrochloric acid.  $\alpha$ - and  $\beta$ -eucaïne hydrochloride in 1 per cent. solution are not altered. In stronger solutions all three hydrochlorides are immediately precipitated by platinic chloride, but the cocaine precipitate is not soluble in hydrochloric acid, while the precipitates by either eucaïne are at once dissolved.

F. Giesel<sup>1</sup> has pointed out that the permanganate of cocaine is much more stable than that formed by most other alkaloids. This fact gives rise to one of its most distinguishing reactions. The test is applied upon a microscopic slide or in a small watch-glass. A drop of a solution of the hydrochloride is placed upon the glass and a

<sup>1</sup> *Pharm. Ztg.*, p. 132, 1886.

very small drop of a solution of potassium permanganate is added. If the solution is strong enough for a precipitate to appear at once the change can be observed on the precipitate, but it is preferable to watch the change of color of the solution itself. With either of the eucaines the color almost immediately begins to change to brown, while with pure cocaine the original color holds generally for fully half an hour, but also eventually changes to brown. The cocaine precipitate examined under the microscope is a beautiful violet-red which also in time turns to brown. This is true of the eucaine precipitates at first, but they rapidly change to brown. Excess of permanganate should be avoided.

Cocaine hydrochloride in solution, in either water or alcohol, polarizes light strongly to the left. Antrich<sup>1</sup> states that this is the best test for the purity of the salt. According to this authority for aqueous solution  $S_d = -52.2$  and for solution in alcohol of 0.9355 sp. gr.,  $S_d = -68.06$ . A solution of the hydrochlorides of either  $\alpha$ - or  $\beta$ -eucaine does not polarize light.

Cocaine when used in the eye almost always causes mydriasis.  $\beta$ -Eucaine does not dilate the pupil.

#### REACTIONS CHARACTERISTIC OF $\beta$ -EUCAINE HYDROCHLORIDE.

The chief characteristic property of  $\beta$ -eucaine hydrochloride is its comparative insolubility in water and alcohol, and it is readily distinguished from cocaine by this property. A small test sample of cocaine hydrochloride, if moistened with its own volume of alcohol or water, dissolves at once, while  $\beta$ -eucaine hydrochloride is little affected. In making the test, however, where weighed quantities are not used, it should be remembered that even  $\beta$ -eucaine is soluble to the extent of 11 per cent. in alcohol, and a too large amount of the solvent should not be used. Just enough to moisten is all that is necessary to dissolve cocaine or  $\alpha$  eucaine hydrochloride.

No chemical reactions of a positive character have been found characteristic of  $\beta$ -eucaine, but the results with permanganate, mercurous chloride, platinic chloride, and polarized light, will identify cocaine, while the tests with potassium iodide, potassium chromate and ammonia will distinguish it from  $\alpha$ -eucaine. These with the other reactions noted will serve to separate it from other alkaloids.

(*To be concluded.*)

<sup>1</sup> *Ber. d. chem. Ges.*, 20, 310.

## CORRESPONDENCE.

ASSOUAN, UPPER EGYPT, January 21ST.

*To the Editor of the AMERICAN JOURNAL OF PHARMACY :*

Through the kindness of Daoud Takla, American Consul, I have had opportunity of inspecting the senna and gum arabic as they are bought by the merchants at this place, and of learning about their commercial history. According to the chief merchant—a most notable follower of the Prophet, over 6 feet tall, black as the darkness in the Mammoth Cave, dignified and courteous as becomes a man of his high local position—the trade, since the destruction of the hosts of the Mahdi, has become as active as it was before his misrule, with the difference that camels no longer bear their burdens into Assouan, having been superseded by the less picturesque but more practical railroad. The saving of cost to some one must be great, as from some districts nearly a whole year was formerly required for the transit. The gum arabic is bought of the natives by traveling merchants, sorted into three varieties, packed into large sacks made of palm leaf and sold to the merchants here, who hold it until notified by telegram from Cairo that the market is favorable, when they ship it down the Nile. I was told that the gum is gathered sometime during the months of January, February and March, each collector having vested rights in a certain portion of the forest. Long incisions are made vertically through the bark and the exuding gum allowed to harden before gathering; in this way, the trees not being injured, the collections can go on year after year. It is affirmed that in Upper Egypt the gum arabic tree flourishes when watered, but fails to yield gum. The warehouses of the merchants of Assouan would hardly suffice in Philadelphia, being simply rectangles surrounded by walls about ten feet high, made of dried mud. In these roofless enclosures sacks or mats containing many thousands of pounds of the gum were piled one upon another. The finest variety of the gum is a very white, beautiful article.

Yours truly, H. C. Wood.

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## PHARMACEUTICAL MEETING.

The sixth of the series of pharmaceutical meetings of the Philadelphia College of Pharmacy for 1901–1902 was held on Tuesday, March 18th. Mr. George M. Beringer, a member of the Board of Trustees, presided. The first paper was on “Liquid Soaps for Surgical and

Toilet Purposes," by M. I. Wilbert, apothecary at the German Hospital, Philadelphia, and was read in the absence of the author by Charles H. LaWall (see page 172). In connection with the paper, Mr. Wilbert sent several samples illustrating the preparations made by the process outlined by him, and also several other samples: one being a soft-soap made of cottonseed oil, according to the formula published in the *AMERICAN JOURNAL OF PHARMACY* for May, 1900 (Vol. 72, page 212), the only difference being the substitution of cottonseed oil for the official linseed oil, on account of the difference in price; also a sample of "liquid soda soap," which differs from the formula given in the *A. J. P.* quoted above, by the substitution of olive oil for cottonseed oil. This was done to overcome any possible objections to the use of this method for making the official *Lini-mentum Saponis*. During the very cold winter weather, soap liniment made from cottonseed-oil soap will sometimes gelatinize; this is, of course, objectionable, and may be obviated by using olive oil, the chemical composition of which will allow it to remain limpid at much lower temperatures. The sample of "soap liniment" was made from the olive oil "liquid soda soap," according to the formula given in the paper quoted above.

In the discussion that followed the reading of the paper, Mr. Beringer called attention to the fact that a number of years ago some of the French and German soaps were imported in liquid form, and that the antiseptic value of liquid soaps was becoming recognized and appreciated by physicians. Dr. Lowe suggested that Columbian spirit might be used in place of ethyl alcohol, and that oil of eucalyptus might be substituted for carbolic acid in the formula given. Dr. Boston said that he had found that microorganisms would grow in 3 to 5 per cent. solutions of carbolic acid. Mr. Beringer stated that they probably would not grow in solutions containing free alkali as in the soaps proposed by Mr. Wilbert.

The next paper was on "The Spread of Tuberculosis by Coughing," by Dr. L. Napoleon Boston, well known for his pathological and sanitary work (see page 169). In discussing this paper, Dr. Lowe referred to the investigations of Dr. Flick, who some years ago showed conclusively that consumption was a contagious disease; and he furthermore believed that there should be a thorough disinfection of homes where consumptives have lived. He also referred to the statement made by the late Dr. DaCosta, that if a patient has

a persistent cough and is losing weight it indicates consumption. Mr. Hancock asked why bakers and cooks, as stated in Dr. Boston's paper, were more subject to tuberculosis than others. Mr. England gave as the probable cause the handling of materials containing fine particles. He also alluded to the fact that the Government was instituting measures to prevent immigrants with tuberculosis from coming to this country. Mr. Hancock stated that in the work of the lapidary and others, who came constantly in contact with fine particles of metal or stone, that the fine particles might set up an irritation in the lungs and thus predispose the worker to consumption. Dr. Boston answered a number of the questions proposed by Mr. Beringer and others, stating some of the rules in medicine regarding tuberculous patients, and showed that the spread of tuberculosis was influenced by race considerations, the occupation of the individual and the age of the person. He referred to the admirable work by Doctors Flick and Anders on the contagiousness of tuberculosis, and of Dr. Ravenal, who is of the opinion that tuberculosis can be transmitted from animals to man.

The next paper was: "On the Manufacture of Deodorized Opium and Tincture" (see page 157), by Mr. Albert E. Ebert, of Chicago, which was read on behalf of the author by Mr. Thomas S. Wiegand.

Mr. Beringer said that the subject was one of great moment to physicians and pharmacists, and he thought that the paper of Mr. Ebert would revolutionize our ideas concerning the properties of the constituents of opium. In commenting upon Battley's sedative, Mr. Beringer stated that in this preparation there was no treatment for the removal of obnoxious principles other than repeated evaporation and solution, during which the resinous matters carrying such principles were removed. Mr. Beringer further said, that while he agreed with Mr. Ebert that granulated opium should be made official, still he did not favor the use of gasoline in its preparation. He said that it was unfortunate that the U.S.P. did not introduce a commercial benzin, and also a purified benzin, giving a method for its preparation. He had for some years been making a purified benzin for his own uses, and said that he had found in some cases the use of a little benzin with ether in the extraction of certain drugs, as well as in the preparation of deodorized opium, prevented an emulsion that was so difficult otherwise to handle. Some years ago

Mr. Beringer called attention (see this JOURNAL, 1890, p. 6) to the properties of commercial benzin, and said that the presence of heavier oils and sulphurous compounds prevented the use of the article for making an agreeable and non-nauseating deodorized tincture of opium. In regard to the use of acetic acid in extracting the narcotine as suggested by Dr. Ebert, Mr. Beringer thought that it did not form an acetate with narcotine, although its use might be advantageous in removing traces of morphine. Others discussing the paper were Messrs. LaWall, England and Kraemer.

Mr. Wiegand commented upon the comprehensiveness of Mr. Ebert's paper and said that it should be attentively read by every one at all interested in the real progress of pharmacy. It is really a history of the subject and covers the ground most thoroughly, and with great fairness. The points and notes most worthy are: (1) the fact that an aqueous preparation of opium is preferable to a hydro-alcoholic one, because it leaves behind the fatty resinous caoutchouc matters which seem to be the most disturbing elements of the drug; (2) the fact that a proper grade of benzin purified thoroughly will remove any of the remaining objectionable material, and has less solvent power over the morphin than ether; (3) the fact that narcotine is not a disturbing element, but on the contrary a stimulant tonic, counteracting the depressing effects that the ordinary preparations of opium produce; (4) incidentally the necessity of a purer and better benzin, being directed by the pharmacopœia and the well-advised caution against the concentrated liquid preparation of opium for the *short-cut* way of making the galenical preparations of opium. Mr. Wiegand moved that a vote of thanks be given Mr. Ebert for the valuable paper he had contributed. The motion was unanimously adopted.

A paper by Ferdinand A. Sieker, New York City, on "Fluid Extract of Nux Vomica" (see page 175), was read by Mr. Freeman P. Stroup.

Mr. England exhibited various samples of caseins, which are used in the arts and for food; also, a sample of sugar of milk (99.7 per cent. pure) and a milk powder for making a substitute for milk. Mr. Beringer called attention to the fact that the difficulty connected with the manufacture of sugar of milk in this country heretofore has been the impurities in the water.

The discussion on "Modern Drug Methods," which had been postponed from a previous meeting, was introduced by Dr. Lowe, who referred to a method of recording prescriptions and the advantages of a Torsion balance for prescription work. Mr. McIntyre referred to the differences in some of the modern stores in the different large cities which he had visited, and said that in each city, and, indeed, in different sections in the same city, different conditions prevailed, and these had to be dealt with accordingly. The modern drug store, as the one of former days, requires the constant supervision of the owner, and the pharmacist must be ready to supply those things asked for by the physician and the public. Mr. Beringer also spoke in a similar strain, and said that in each locality different methods must be pursued; and that the business methods must be shaped according to the locality, irrespective of even what we may have as our ideal. Of course, after the confidence of physicians and the public is secured, then individual influences may be brought to bear. Mr. Beringer alluded to a method of keeping a daily record of prescriptions which he had adopted, which included originals, renewals and the price of each. In regard to the subject of weighing medicines, Mr. Beringer said that he hoped that no pharmacist placed the substance on the scale-pan direct, and that he himself used different kinds of paper and glass crystals, depending on the nature of the substance to be weighed.

Mr. Wm. Vought, a representative of the Leitz microscope firm, called attention to the possibilities of the pharmacist doing bacteriological, pathological and other similar lines of work. He enumerated a number of instances showing that properly qualified persons, particularly in the West, had been successful in this direction, not only adding to their financial income, but also to their professional standing. He stated that an outlay of about \$100 was sufficient for equipping a laboratory to carry on most of this work.

At the next meeting there will be a discussion on the advisability of promulgating a definition for the term spoonful, and also on the metric equivalents of the same. The following circular has been gotten out, and those desiring to express an opinion on the questions contained therein are requested to send the same to either Mr. M. I. Wilbert, Apothecary to the German Hospital, Philadelphia, or to the Secretary of the Committee having these meetings in charge.

## DEFINITION OF SPOONFUL.

Would you be in favor of promulgating a definition for the term spoonful, with a view of obtaining more uniformity and greater accuracy in the administration of liquid medicines?

If so, would you be in favor of adopting the definition as given in the French Codex? This is as follows: A spoon is full when the liquid it contains comes up to, but does not show a curve above, the upper edge or rim of the bowl.

For the benefit of those physicians who are using the metric system, it would appear advisable to adopt some acceptable equivalents for the approximate measures that are used in speaking of, or in measuring out, doses of liquid medicines. In the following table we have indicated:

1. The exact equivalent in the metric system, of the tea, dessert and tablespoon as used in this country at the present time.
2. The approximate equivalents as used by some practitioners.
3. Proposed metric equivalents, based on the actual capacity of the spoons in use at the present time.

Will you kindly indicate which of these you would favor?

	1	2	3	4
Teaspoonful . . . . .	3.696	4	5	5
Dessertspoonful . . . . .	7.393	8	10	10
Tablespoonful . . . . .	14.786	16	15	20

## NOTES AND NEWS.

THE ITALIAN PHARMACOPŒIA is being revised, and we are informed by the *Chem. and Drug.* that it will contain, among other features, formulas for veterinary use, an official method for the analysis of surgical dressings, a method for the sterilization of solutions for hypodermic use, tables of poisons, antidotes, incompatibles and dangerous mixtures, and will make obligatory the use of a model pill excipient in cases where none is mentioned in the prescription.

METRIC SYSTEM IN THE UNITED STATES.—The report of the special committee appointed by the Franklin Institute to consider the feasibility and advisability of the adoption of the metric system in the United States is as follows:

WHEREAS, It is desirable to obtain an international standard of weights and measures, also to simplify and regulate some of our existing standards; and

WHEREAS, The metric system is commendable not only as a suitable international standard, but also for facility of computation, convenience in memorizing and simplicity of enumeration;

*Resolved*, That the Franklin Institute approves of any movement which will



promote the universal introduction of the metric system with the least confusion and expense.

*Resolved*, That the national government should enact such laws as will ensure the adoption of the metric system of weights and measures as the sole standard in its various departments as rapidly as may be consistent with the public service.

THE VALUE OF A COLLEGE EDUCATION.—R. T. Crane, of Chicago, recently set out to discover by practical means what is the real value of a college education. He addressed inquiries to the presidents of a number of universities, to nearly 1,600 university graduates, and to 100 or more business men who have had large opportunities for observation. The testimony gathered thus from the most varied sources is brought together in book-form, and it includes many interesting expressions of opinion. No conclusion which is at all absolute is reached, and this must be reckoned to be impossible in the very nature of the case. Nevertheless, it is very satisfactory to know that some progress has been made in the discussion of the old subject, for Mr. Crane seems to have found no one who really thinks, as some formerly did, that a college training is a hindrance to a young man.

COMMERCIALISM AND MEDICINE.—In an address at the formal opening of the Mercy Hospital Operating Amphitheatre, under the auspices of the Chicago Medical Society and Northwestern University, Dr. John B. Deaver, Philadelphia, said: "A spirit of commercialism is one of the greatest enemies of a medical school. A large production at a cheap rate may be a good enough aim for a business house, but this spirit is fatal to a medical school. Too many schools seem to take pride in their large enrollment of students, forgetting at the same time that teachers and clinical material are entirely inadequate for the proper instruction of so large a body of men."

LICENSES FOR NURSES.—The question as to whether trained nurses should not be licensed and all others forbidden by law to practice came up at a recent meeting of a woman's club, according to the *New York Evening Sun*. One member opposed this proposition so vigorously that she was asked to take the floor and give the reason for her opposition. She declared that many young women took up nursing while better fitted for any other vocation on earth, while there were those, on the other hand, whose experience, acquired only through performing, gratuitously, services for neighbors and friends, showed such natural aptitudes that they were always in demand. She said such were often driven through force of circumstances to adopt the calling of a nurse, and would, if the license law were passed, be unjustly debarred. "Sensibility and fine feeling," said the woman, "are as necessary in caring for the sick and convalescent as training, and a woman not 'trained,' but with all the qualifications of a nurse, was more valuable than a trained nurse without these natural qualifications." The woman then illustrated her meaning by an anecdote. "The children's ward of a hospital in one of our Western cities had been given a globe of gold fish. The little patients took great pleasure in watching the fish darting in and out among the aquatic plants and seemed to forget for a time sickness and suffering. One of the nurses, wishing to use the table on which the globe of gold fish stood, put it on the radiator. A small patient called out in alarm that the fishes would be roasted. The nurse only laughed,

and left the globe where she had put it, and upon her return from dinner she saw the water was at the boiling point and the fish all dead." All agreed that the gentle offices of such a nurse could easily be dispensed with.

A PORTRAIT OF PROF. PRESCOTT.—At the supper and reunion that was held at the St. Louis meeting of the A. Ph. A. of the Alumni of the University of Michigan, a plan was formulated to procure a life-size oil portrait of Dr. A. B. Prescott and present it to the university. A committee was appointed consisting of Dr. A. B. Lyons, Chairman; A. B. Stevens, Treasurer, J. W. T. Knox, Secretary, and F. W. R. Perry and A. S. Parker, who have successfully arranged for this undertaking. The portrait has been made by Percy Ives, one of the best known of portrait artists, and is to be presented to the university during commencement week, the exact date not yet being determined. It is desired also to have a general reunion and banquet for the alumni on that occasion, and it is hoped that every alumnus of the pharmacy school will make a strong effort to be present. Some distinguished scientist will be invited to deliver the principal address of the occasion, and there will be a number of shorter addresses by alumni and others.

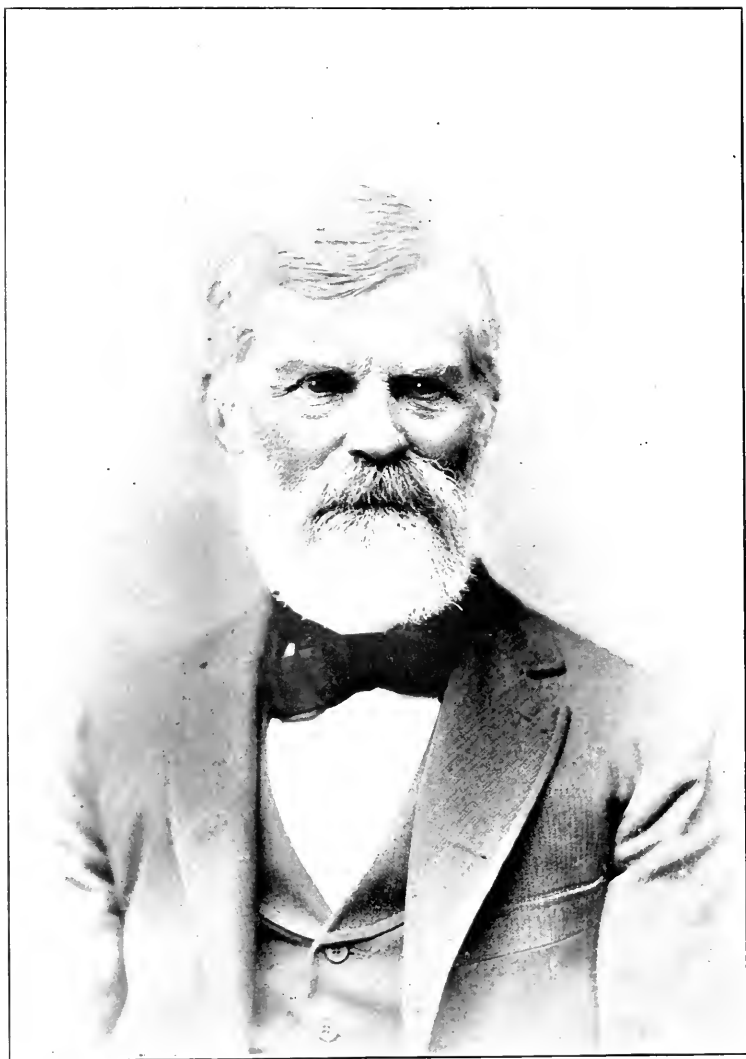
A BANQUET TO ENNO SANDER.—On the occasion of his eightieth birthday the pharmaceutical friends of Dr. Sander tendered him a banquet in St. Louis. Mr. Albert E. Ebert, of Chicago, acted as toastmaster, and toasts were responded to by various members of the Faculty and alumni of the St. Louis College of Pharmacy, of which he is an ex-president, one of the founders, and was at one time a member of the Faculty. According to the *American Druggist*, Dr. Sander was born in Trinum, Anhalt, Germany. He took his Ph.D. degree in chemistry at Halle, in 1847, participated in the revolution of 1848, was captured and imprisoned, but subsequently pardoned. Coming to the United States in 1850, he went to St. Louis in 1852, where he first taught school, and then engaged in the practice of pharmacy. In 1868 he began the manufacture of chemicals, and later took up artificial mineral waters, in which he has been very successful. In 1871 he was elected president of the American Pharmaceutical Association, and for forty years consecutively has been treasurer of the St. Louis Academy of Sciences.

AMERICAN CHEMISTS HONORED.—*Prof. Wolcott Gibbs*, of Harvard, America's foremost chemist, was honored on February 22d by having conferred on him by the University of Pennsylvania the Doctorate of Laws; *Prof. Ira Remsen* was installed as President of Johns Hopkins University at the twenty-fifth anniversary of the founding of that institution; the new Health Board of New York City made an important departure from precedent by creating a medical advisory board of twelve prominent physicians (who serve without pay), with *Prof. Charles F. Chandler*, of Columbia University, at the head, with the title of Consulting Sanitarian.

THE AMERICAN ELECTRO-CHEMICAL SOCIETY, which has just been organized with nearly 300 members, will hold its first meeting in Philadelphia from April 3d-5th.

THE PENNSYLVANIA PHARMACEUTICAL ASSOCIATION will hold its annual meeting at Buena Vista Spring Hotel, June 24th, instead of June 17th, as previously announced.





EMIL SCHEFFER.

# THE AMERICAN JOURNAL OF PHARMACY

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*MAY, 1902.*

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EMIL SCHEFFER.

BY C. LEWIS DIEHL.

As near as I can now remember, I became acquainted with Emil Scheffer in the autumn of 1866—possibly in the spring of 1867. Some charitable or other popular entertainment was to be given, and part of the program consisted in certain chemical experiments which were to be exhibited by Prof. William Hailman, at that time at the head of the German-English Academy, who came to consult with me and to solicit my assistance. In the course of our conversation he mentioned that he had also been promised the co-operation of Emil Scheffer, and when I remarked that I had not yet met that gentleman, he expressed his surprise that I should have been a resident of Louisville for nearly two years without having become acquainted with a man so prominent in the profession of pharmacy and chemistry, and so kindly and lovable in disposition. I explained, that although well aware of the high professional reputation of Mr. Scheffer, he had been represented to me as being cold and unapproachable in his disposition, and that therefore I had not sought an opportunity to become acquainted; whereupon, assuring me that Scheffer had been misrepresented to me, and with evident indignation at what he qualified as "base slander," he insisted that I should at once accompany him and become acquainted with a man whom he considered to be, and honored as one of nature's noblemen. Accordingly I met Emil Scheffer on that to me memorable day for the first time, and I may say that from that day to the Sunday immediately preceding his death, which occurred on January

22d of this year, scarcely a week passed—unless prevented by absence from the city—during which we failed to meet in friendly intercourse and conversation, in the course of which I soon gained an insight into a mind as beautiful and simple as it was lofty and generous. An intimate friendship was thus cemented, and we confided to each other much that is ordinarily revealed only to those connected by ties of blood. It is, therefore, to me a welcome task as well as a sad duty when I respond to the request of the editor of the *AMERICAN JOURNAL OF PHARMACY* to write a sketch of the life and career of my departed friend and colleague, in which I propose to give such details as have come to my personal knowledge, and that may be published with the sanction of the bereaved family.

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Emil Scheffer was the youngest of the seven children—three sons and four daughters—that blessed the union of Carl Ludwig Frederick Scheffer and Marie Maurer. He was born at Stuttgart, the capital city of Wurtemberg, on July 7, 1821, but it was not allotted him to experience the loving care of a father, who died when Emil was scarcely two-and-one-half years old, during the month of December, 1823, in the prime of life, being barely forty-four years of age. With but a slender fortune remaining for her maintenance, one may well conceive of the straits the widow encountered in providing for and educating her seven children after the death of her husband. Fortunately, the education of the elder children, notably of the daughters, had been well advanced; they had become proficient in the arts of drawing and painting, and of fine needlework, which now served them a good turn, so that, when in 1848 the good mother also closed her eyes in eternal sleep, they were able to eke out a comfortable existence as teachers of their respective arts and accomplishments—in fact, were so engaged until in their advanced age they were able to retire comfortably from active occupation. It was under conditions of adversity, then, that Emil Scheffer grew to manhood, but under the beneficent influence and loving care of a good mother and affectionate sisters. Of these he always spoke with touching tenderness, and when, at ages approaching and exceeding ninety years, all but one of the sisters were claimed by the Great Reaper, he mourned them as sincerely as though they had been his daily companions. His

school-days began at the early age of five years—at first in Stuttgart until 1829, then at Boeblingen until the spring of 1835, when he returned to Stuttgart, entering upon a brief course at the Polytechnical School. In the autumn of the same year, however, it was found expedient to select a vocation for him. His studious habits and inclination fitting him admirably for the profession of pharmacy, he was apprenticed to an apothecary in the renowned university town of Tuebingen where, under the most favorable conditions, he laid the foundation for the varied and vast fund of knowledge upon which depended the distinguished reputation he enjoyed in after years.

Although we know Scheffer mainly as an accomplished chemist, his favorite pursuit, as he frequently assured me, was that of botany; and while not neglecting, as we may readily understand, the study of pharmacy, of chemistry, and of the physical sciences, pharmacognosy and botany were to him the most attractive. He loved to speak of the numerous excursions he made into the fields and forests of his native Suabia, devoting his leisure hours to studying the rich and varied flora of his immediate surroundings, and extending his botanical excursions during his annual vacations as far as the beautiful "Schwartzwald" and even to the magnificent Suabian Alps.

Having completed his term of apprenticeship in 1840, and passed a highly creditable examination, Scheffer secured a position in Constance, where he remained two years, then in Zurich until 1844, and afterwards for short periods in Frankfort-on-the-Main and in Mannheim-on-the-Rhine. Returning to Stuttgart in the spring of 1845, he again attended the Polytechnicum, preparatory to his finishing course at the University of Tuebingen, beginning in the autumn of the same year. Here he had opportunity to listen to and absorb the lectures of some of the most eminent German professors, among them the celebrated Gmelin, author of "Gmelin's Chemistry," whose assistant he became and with whom he remained after passing his "State examination" until shortly before his departure for America, in the spring of 1849.

The years 1848-49, it will be remembered, were years of turmoil throughout the continent of Europe. The revolution in France, which resulted in the dethronement of Louis Phillip, spread to Austria and the German States in general, and for a brief period

these were completely revolutionized. The reaction came, however, early in 1849, and Scheffer, who in common with the liberal intellects of his country had espoused the revolutionary cause, found his prospects for future advancement jeopardized to such a degree that he resolved to try his fortune in the United States, as so many of his friends were then about to do or had done before him—this step having become less regrettable because the ties that bound him to his native land had been loosened by the death of his mother.

Leaving the port of Havre, May 30, 1849, Scheffer arrived in New York after a pleasant voyage of thirty days; but finding no congenial position he continued his journey westward, arriving in Cincinnati early during the month of July, where he soon entered the employ of the late Charles Schmidt, at that period one of the most popular German pharmacists of that city. It is needless to say that he was soon recognized to be a pharmacist of more than ordinary accomplishments, his reputation becoming so widespread that when in the autumn of 1850 the widow of Frederick William Kniess, of Louisville, needed a manager for the drug store left on her hands, her friends advised her to secure his services for that position. Accepting, he entered upon his duties on November 10, 1850, and soon succeeded in developing and expanding the business so satisfactorily that the owner admitted him to a full partnership, the compact being sealed by the gift of her hand and heart on January 20, 1852. This union with Olivia Kniess, née Beckham, was blessed during the happy years that followed with the advent of six children—three sons and three daughters—Emil, August and Edward, Minnie, Olivia and Ida; of these, five survive their parents, the second son, Dr. August Scheffer, being taken away in the bloom of early manhood, March 8, 1890, following his mother, whose death occurred in the month of August, 1889.

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Scheffer's drug store was located on the north side of Market street, between Floyd and Preston. In its appointments it was as simple and unpretentious as was its owner, but it was a store that, in contrast to most modern stores, would bear close inspection. Cleanliness and order, thorough and systematic, prevailed throughout. In the old-time shop bottles, the contents, as nearly conformable to the standard as could be demanded, were protected by caps constructed during hours of leisure from card-board and silver paper;



the drawers were a pattern of orderliness both as to contents and condition; the prescription-counter, flanked on the side by a costly and accurate analytical balance, was spacious and appointed with every convenience that might facilitate and expedite the compounding and delivery of medicines. A good, well-ventilated cellar, the pink of orderliness and cleanliness, served for the storage of perishable goods, while the stock of herbs, roots and barks was stored in a dry and lofty apartment over the store. To the immediate rear of the store was the laboratory, leading into a storeroom for the excess of unperishable stock; and in a separate building, in the rear of all, was located a supplemental laboratory for processes of fusion, calcinations and operations evolving noxious or corrosive gases. These laboratories were not only well appointed in all respects for the preparation of galenicals and chemicals—organic as well as inorganic—but they were in daily use. And yet, when one approached the house, there was little to distinguish it from its equally humble neighbors, except, indeed, the cleanliness of the glass in the three double doors composing the front of the store.

Equipped as explained, what wonder that Scheffer should have drawn his patrons from all parts of the city and from all classes. For many years he enjoyed the patronage of the wealthiest as well as of the humblest, and he secured and maintained the confidence and respect of the foremost physicians of his adopted home, who consulted him freely, and for whom he prepared many preparations and chemicals that, although now as common as cream of tartar or quinine, were during the third quarter of the past century unobtainable or rarely found in the drug market. His general knowledge of technical operations also served to increase his popularity, for he was daily consulted by dyers, tanners, artificers and manufacturers in different lines requiring advice on chemical processes—all of which was given freely and gratuitously. Moreover, the completeness and variety of his stock, and his comprehensive knowledge, enabled him to supply his brother pharmacists with many medications and preparations that were not profitably—or for other reasons—stocked by them, and he was quite as frequently consulted by them on questions with which they were unfamiliar. Implicit reliance was placed by the latter in all that came from Scheffer's drug store, a fact which was plainly demonstrated when, in 1882, he closed his drug business definitely. Conditions had undergone

a revolution during the thirty-two years of his incumbency; preparations which, in the early years of his career were made by the pharmacists, were now supplied by manufacturers; the older remedial agents gave way to new ones introduced; and, to cap it all, the city had grown, so to speak, away from him, leaving but a corporal's guard of his former patrons. Under these circumstances he could not hope to get an adequate offer for his store as a whole, and he accordingly resolved to sell out in detail. Ordinarily, this would mean to sell at a sacrifice; but when the sale was completed, he assured me that he had realized on all of his stock—offering only that which was of merchantable quality—a fair wholesale price, the stock and store-appurtenances being mainly purchased by the retail pharmacists of the city.

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Up to the year 1870, our knowledge of the proteolytic ferments was very imperfect, and with the exception of the impure products, called "pepsin," none of these ferments were employed in medicine. These pepsins were without exception produced from the inner coating of the stomach of herbivorous animals, the American products from beef stomachs, the French pepsin from the stomach of the sheep—the latter being the kind of pepsin employed almost exclusively by American practitioners. Pepsin being administered for the purpose of restoring the impaired digestive functions of man, it occurred to Scheffer, when entrusted by one of his medical friends with the problem of preparing it in a liquid form, that the stomach of an omnivorous animal—that of the pig, for instance—would yield a preparation more closely representing the digestive principle in the stomach of omnivorous man than would a similar preparation made from the stomachs of herbivores. This course of reasoning led him to select the mucous membrane of the pig's stomach as the basis of his "liquid pepsin," his formula for its preparation being published by him to the world so soon as it had been determined to his satisfaction that this liquid possessed the expected activity.

But Scheffer was not the man to rest satisfied with this achievement. He realized that the crude methods recommended by the French authorities for preparing "dry pepsin"—scraping off the mucous membrane from sheep's stomachs, extraction with water, clarification with lead acetate, removal of excess of lead salt by

sulph-hydric acid, concentration by the aid of moderate temperature, etc.—involved so many possibilities of change, that a process of isolation and purification by the aid of less energetic agents was a desideratum. He remembered that his old professor, Gmelin, had pointed out during his lectures the facility with which albumen and allied bodies are thrown out of aqueous solution by common salt, and I remember well the exultation with which he demonstrated to me the fact that when a solution of pepsin is mixed with sufficient brine, a frothy scum gradually develops and rises to the surface, which scum on closer inspection proves to be composed of minute globules, and that these globules, when redissolved in water by the aid of a little hydrochloric acid, possess the digestive qualities of the original pepsin solution unimpaired. It remained only to find suitable methods of separating the pure pepsin and to reduce it to a dry condition and permanently active form. As is now well known, this is a very simple process, but it was not so simple a matter to achieve it initially, so that it was not until 1872 that Scheffer was able to communicate a process which has made his name famous throughout the civilized world. Briefly stated, this process consists in collecting the pepsin globules on straining cloths, expression under a powerful press, washing the press-cake with a little water to remove salt as much as possible, then triturating it in a mortar with milk-sugar so as to form a damp powder, which is completely dried in a current of air at the ordinary temperature and reduced to a fine powder. This is finally adjusted by the further addition of milk-sugar to such a strength that a stated quantity will effect the solution of a stated quantity of freshly coagulated egg-white in a definite quantity of acidulated water within a given period of time.

In revealing his process for the manufacture of "saccharated pepsin" to the world, Scheffer has undoubtedly given the incentive to the more intelligent and comprehensive study of the proteolytic ferments, and these, in their turn, have encouraged the investigation and study of biological products in general. It is unquestionable, that with the advent of "Scheffer's pepsin" the use of pepsin in the practice of medicine secured a fast and permanent foothold, and it need not be told that hundreds of individuals have made a competence by the manufacture of pepsin, or of its preparations—though none have been so generous, as was Scheffer, to make their methods

common property. During the years of his experiments on pepsin he freely spoke with me both regarding the difficulties encountered and of his intention in the event of success. He never for a moment considered the propriety of withholding his process from the public; and while my own views on this subject were in perfect accord with his, I do not think that he would have adopted a different course if he had never met me at all. To give a further insight into the lofty character of the man, I need perhaps only mention that after definitely relinquishing the manufacture of pepsin—which had drifted into the hands of the “pepton-pepsin” manufacturer—he absolutely declined to accept a highly lucrative offer made to him by a most responsible firm for the right to manufacture pepsin under his name. When speaking of this to me, he explained that he did not wish his name coupled with a product which, in all probability, would eventually be “pepton-pepsin”—however honest the present intention of the applicant might be: that “pepton-pepsin” was more popular, because more easily prepared and *apparently* more powerful. Its absolute superiority as a digestive agent over his precipitated pepsin he denied emphatically, and he died under the conviction that “absolute pepsin” can only be prepared by his own process, or by one essentially conforming to it.

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Naturally of a modest and retiring disposition, Scheffer's intercourse with his fellow pharmacists was chiefly limited to the courteous expedition of the demands made on him, and it was probably due to this natural reserve that he was, from some quarters at least, misrepresented as being cold and unapproachable. But his intimates knew better; they valued him for his congenial and sympathetic disposition, the earnestness and sincerity of his character, and his loyalty to his friends; and these qualities manifested themselves eventually to the less intimate of his acquaintances, when, at the close of the sixties, the Louisville College of Pharmacy was called into existence. He had, in common with some of his professional friends, long deplored the absence of organization among his fellow pharmacists, and therefore entered with heart and soul into the scheme of organizing and maintaining a college and school of pharmacy; becoming one of its founders, and serving it as one of its directors and professors, as treasurer and as president, during a period covering more than a score of years: director, continuously

from its organization in 1866 until 1889; president, from 1884 to 1888; treasurer during the year 1888-1889, and Professor of Materia Medica and Botany, continuously from 1871 until the end of the school session of 1883-1884. Burdened with the cares of an active business, his time largely occupied with analytical and other professional work, he yet found the time to attend to the arduous duties involved in these offices, and to attend to them thoroughly. However, this is history that can be more satisfactorily told in an historical sketch of the college, which the present memorial is not intended to be. Suffice it to say, that he saw the college grow from its weakly beginning to sturdy independence and usefulness, and that no one member of the college contributed so much time, intellect and substance towards paving the way to its final success as did Emil Scheffer.

In 1872 Scheffer joined the American Pharmaceutical Association, whose annual meetings he frequently attended, and whose proceedings he followed with lively interest, until, with advancing years, having relinquished his active business pursuits, he reluctantly severed his connection. He became a member of the Committee of Revision of the Pharmacopœia of the United States in 1880, being selected to fill the vacancy caused by the resignation of the late Dr. Edward R. Squibb, whose place he filled creditably for the remainder of the term, ending with the Convention of 1890. He likewise served his adopted State as one of its first Commissioners of Pharmacy, from 1874, when a law regulating the practice of pharmacy within the jurisdiction of Kentucky was placed upon its statutes, until 1882, and it goes without saying that he fulfilled his trust with absolute fidelity and to the advantage of the commonwealth.

What Scheffer was to his family cannot be discussed without invading the sanctity of his home-life. It is sufficient for us to know that he is mourned by his children and grandchildren as only a good and affectionate parent can be mourned. And he was all that, as well as a good husband, brother and friend. He was also a good citizen; and though he returned to the land of his childhood and early manhood on five different occasions, always accompanied by one or more members of his family, he did so because of his affectionate regard for his old sisters and brothers, and not because of disloyalty—even in thought—to the land of his adoption.

LOUISVILLE, KY., April, 1902.

## SPOONFUL DOSES.

A DEFINITION FOR, AND THEIR EQUIVALENTS.

BY M. I. WILBERT,  
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The subject of doses and their administration would strike one as being of more importance than the amount of thought that has been expended on it would appear to indicate.

Volumes have been written on the standardization of drugs and their preparations, while little or no attention has been paid to how these standardized drugs and preparations are administered to the patient whose ills and affections they are intended to cure or relieve.

In a paper published in the March number of the *AMERICAN JOURNAL OF PHARMACY* the writer called attention to the difference that existed in the capacity of the various medicine measures that are in use at the present time. In the same paper attention was also directed to the variation that may be occasioned by the personal equation of the nurse, or the person doing the measuring.

That there should be at least a semblance of accuracy in the administration of liquid medicines will readily be admitted by all who have ever given the subject a reasonable amount of thought. This is the more apparent when we remember that there are, under the most favorable conditions, so many factors that may modify or change the effect that certain substances are likely to have on the animal organism, either in health or disease, that the matter of knowing, approximately at least, what amount of a certain drug has brought about a particular change or result is not only of interest, but may be of vital importance, as it is only by analogy, or the careful study of the effects of corresponding doses on various individuals, that we are able to make any scientific progress in the rational application and use of medicinal substances.

Another interesting possibility is the fact that occasionally startling and sometimes serious effects are caused by drugs under certain conditions. Here again we see how important it may be, not only for the physician, and the patient directly interested, but also for others, to know exactly how much or how little of a drug has caused these unlooked-for or secondary effects. In this connection it should be remembered that instead of the patient having an idiosyncrasy or an abnormal toleration for a certain drug, it is always

quite possible that he has been given either more or less than the intended quantity, and, as a result of this, has either not responded, or has responded in a way that was unexpected and startling. So that, if for no other reason than the scientific study of the incidental or unexpected effects of drugs, it would appear desirable that any abnormal variation from the intended quantity or dose should be guarded against and prevented, if possible.

The reason why well-made liquid preparations are generally conceded to be more efficient, and consequently more desirable, than a corresponding amount of a dry drug or a solid extract, is found in the physiological necessity, that materials to be absorbed by the stomach or intestinal canal must be in a fluid or a semifluid state; and while it is true that under ordinary circumstances the stomach has the property of dissolving many otherwise refractory substances, it must also be remembered that in case of illness or disease, the whole gastro-intestinal tract is necessarily less active, and in many cases is debilitated to such an extent that it will not absorb or assimilate the plainest food, and certainly would not be in any condition to dissolve and absorb medicinal ingredients contained in a hard pill or bolus mixed up with a large amount of inert or perhaps irritating powder.

The advantages of liquid preparations and their quality being acknowledged, it remains for us to inquire into the practicability of adjusting or improving the methods of measuring out and administering them. Modern practices appear to demand that liquid preparations be not only elegant in appearance, pleasant to the taste and smell, but also concentrated to a degree that will allow a number of doses being carried about in a vial no larger than would be needed to contain a single dose of an old-time tea or infusion.

By apparent, general consent, rather than by any carefully studied-out plan, doses have been adjusted to correspond, more or less closely, with the capacities of various household utensils, while from these in turn we have derived distinctive names for the various quantities, as teacupful, wineglassful, tablespoonful or teaspoonful doses.

Our object in this particular paper is to call attention again to the desirability of recognizing the importance of correctly measuring these smaller doses, the evident reason, of course, being that mixtures that are to be given in tea or tablespoonful quantities are

necessarily more potent than those given in larger amounts. This would indicate, of course, that the dose measures used should facilitate, if possible, the accurate division of the mixture into the required number of doses.

Spoons have been in use as medicine measures for such an extended period of time, and have established themselves so firmly in popular practice, that there are many people who would not think of using any other variety or kind of medicine measure.

It may also be of interest to note that in many households a particular spoon is sometimes set aside as the medicine spoon; this is usually of sterling silver, and the continued use of such a spoon will sometimes develop associations and reminiscences that are likely to become highly prized or sacred.

But even apart from any personal preference for or liking of a particular spoon, these household utensils are so common and their use as measures for various culinary purposes so firmly established, that it will be well-nigh impossible to displace them entirely by any substitute or contrivance that we may possibly find to offer. One other interesting and probably very important reason why spoons are preferred by many for measuring liquids, is the fact that they are more readily cleaned than are ordinary medicine glasses. This, while it appears to be but a trifling matter, nevertheless is one of considerable importance.

This line of thought would naturally recall the oft-repeated assertion that spoons are extremely variable in size and capacity. Inquiry among a number of jewelers, silversmiths, and manufacturers of spoons elicited the opinions that there had been little or no change in the actual capacity of the various spoons, and while they do vary in style or shape of bowl, the actual capacity of the bowl varies very little. As was pointed out to the writer, a wide or round bowl is usually quite shallow, while a narrow-pointed spoon is generally quite deep.

These opinions were later confirmed by a number of additional measurements that were made of various makes and sizes of spoons. The results of these measurements correspond very closely with those given in the table on dose measures quoted above. These investigations also appear to confirm the suggested fact that in actual practice there is less variation in the capacity of spoons than in the glass medicine measures that are usually recommended, and



that the supposed variation is largely, if not entirely due to the difference in the quantity that may be heaped on a spoon of a certain shape. It will readily be seen that a wide shallow spoon will hold more above the rim than one that is narrow and deep, though the actual capacity of the bowl may not differ materially.

The writer, however, does not want to put himself on record as advising the use of spoons in preference to an accurately graduated medicine measure. It is no doubt possible to construct a graduated measure that will not only facilitate the accurate measuring out of the desired dose, but which at the same time may be used to dilute and to administer such doses to the patient. This desirable combination, however, is not available at the present time.

With a view of bringing this question of doses and dose measures to the attention of physicians and pharmacists, a limited number of circular letters were sent out, asking for opinions on two different subjects—the first being in reference to the advisability of promulgating a definition for the term “spoonful,” and in the event of this being acceptable, whether or not the definition as given in the French Codex would appear to cover the necessary points. This definition reads as follows: “A spoon is full when the liquid it contains comes up to but does not show a curve above the upper edge or rim of the bowl.”

The second question was in connection with the gradual, but nevertheless steady increase in the number of physicians using the metric system of weights and measures in their prescription writing. At the present time there is no generally accepted equivalent for what is intended when the dose is indicated in a metric quantity, nor on the other hand, is there any accepted or generally understood quantity implied by the term *teaspoonful*, for instance, so that the conscientious pharmacist has no definite basis for estimating or controlling the dose of any active ingredients that may have been called for by the prescriber.

Briefly, the questions were as follows: Should we advise the adoption and use of 4, 8 and 16 c.c. as the approximate equivalents for the terms *tea*, *dessert* and *tablespoonful* respectively? They would correspond nearly to the present equivalents, namely, 1, 2 and 4 drams.

Should we use and advocate the equivalents as 5, 10 and 15 c.c. on account of their being decimal quantities and corresponding almost exactly to the actual capacities of spoons in actual use?

Or, as an alternative, should we adopt the French equivalents, as given by some authorities: these are 5, 10 and 20 c.c. and preserve the relations 1, 2, 4, as used in our present equivalents 1, 2 and 4 drams?

As might have been expected, the answers received show that there is considerable difference of opinion on the questions as stated. Let us take up, first, the question of promulgating a definition for the term spoonful.

Of the first sixty answers received, four were negative, six were evasive or non-committal, and fifty were in favor of a definition, and were satisfied with that given by the French Codex.

Of the four that objected to a definition, two objected to the use of spoons as medicine measures, and suggested, that in a matter so important as the administration of medicines should be, there would be no excuse for any one not being able to provide an accurately graduated medicine glass.

Two others objected to a definition, feeling that it would be of no advantage, as the personal equation of the individual doing the measuring could not be eliminated by any known means of instruction or demonstration.

As will be seen, by far the greater number of answers were in favor of a definition, as tending to greater accuracy, if for no other reason than calling the attention of the physician to the possible variation in the quantity that a spoon will hold when even, or when heaping full. This single possibility would appear to be of sufficient importance to warrant the adoption or promulgation of such a definition. For, as is urged, if once the physician's attention has been properly called to the possible variation in measured doses, he will, in important cases at least, call the attention of the nurse or patient to the necessity of exercising a certain amount of care in measuring out doses of active or important medicines.

In answer to the question on the most desirable equivalents for the various spoons in metric quantities, the replies were as follows:

Six suggested the use of 4, 8 and 16 c.c. as being in conformity with present practice and not necessitating the learning of a new set of equivalents or a new relation of these equivalents.

Thirty-six were in favor of the equivalents 5, 10 and 15 c.c. as being in keeping with a decimal system of notation, and also because these quantities correspond very nearly with the actual capacities of spoons available at the present time.

Eight for various reasons—chiefly for the sake of uniformity with the French—preferred the figures 5, 10 and 20. The argument that was advanced by several who were in favor of the latter equivalent was, that it would preserve the comparative relation of the equivalents for spoons as used at the present time, and that in addition it would correspond with the equivalents as used in France, so that if we should adopt the same in this country we would follow out the lines of adopting some universally used equivalents.

The available data at the writer's command does not allow him to make any definite statement as to the practices or equivalents that are used in the various European countries. As is well known, both in this country as well as in England, the equivalents for tea, dessert and tablespoon, are 1, 2 and 4 drams, respectively. In Germany, however, where the various galenical preparations are made entirely by weight, the prescriptions are also compounded in the same way. The resulting doses, however, are usually measured out in spoonful quantities, and the equivalents, according to which the apothecary is directed to estimate the maximum doses of active or poisonous drugs, are as follows:

Teaspoonful, from . . . . .	3 to 5 grammes.
Children's spoonful, from . . . . .	6 to 8 grammes.
Tablespoonful, from . . . . .	10 to 15 grammes.

It will be noted that these equivalents do not at all correspond with those supposedly in use in France.

In reference to the latter country, both the United States Dispensatory and Dorvault's *L'Officine* give 5, 10 and 20 c.c. as the approximate equivalents for the various spoons.

The late Professor Maisch, in a table of equivalents published in the National Dispensatory, gives 5, 10 and 15 c.c. as the equivalents used in France for tea, dessert and tablespoonful. An attempt on the part of the writer to trace the origin of this particular table did not result very satisfactory. The sole surviving editor of the recent edition of that work, in answer to a letter of inquiry, stated that he was not acquainted with the source of the quotation but felt sure that it was verified, as its author was acknowledged to have been most careful and conscientious with all quotations.

The proposition to use 4, 8, and 16 c.c. as the metric equivalents for the various sizes of spoons can hardly be called a happy one, owing to the fact that square numbers do not fit in well with

decimals; and that if we wish to popularize the metric system in this country, we must simplify it so as to induce people to think in metric quantities, as it is practically impossible to think of quantities in one system of weights and measures and then transpose them into another with any appreciable amount of facility or satisfaction. For these reasons it would appear desirable to use equivalents that not only differ from those generally accepted but also fit in better with a decimal system of notation.

To sum up, then, the proofs and arguments that have been advanced would seem to indicate, that so long as doses of medicines are referred to as being spoonful quantities, spoons will be largely used as medicine measures. If spoons are used to measure out doses of active medicines, it would appear that we should, at least, make some effort to secure greater accuracy and uniformity in the quantities that are likely to be administered. For this purpose the adoption of a descriptive definition, indicating the approximate amount that is intended by the term spoonful, would appear to offer some possibility of securing the desired results.

As regards the proposed equivalents for tea, dessert, and table-spoonful it would appear to be desirable that we adopt quantities that will fit in well with the system of notation used in the metric system of weights and measures; and here again, if doses are to be referred to as being spoonful quantities, these quantities should conform as nearly as possible with the actual capacities of the spoons that they are supposed to represent.

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## CHAMOIS SKINS.

THEIR PREPARATION FOR THE MARKET AND THEIR COMMERCIAL  
VARIETIES.

BY CHARLES C. DRUEDING.

In presenting this article the writer will endeavor to place before you a plain, intelligible treatise on this subject, as he understands it from his experience of manufacture, or tanning rather, during an experience of about eighteen years.

The name chamois skin is rather a misnomer; it originates from the chamois animal, the zoological name being *Rupricapra Targus*. This animal inhabits the European Alps and Caucasian Mountains and resembles a goat or deer. These animals are very shy, and

hunters will follow them for days over dangerous mountain passes until they finally bring their prey at bay.

The animal is about the size of a goat or deer; of a dark chestnut-brown color, with the exception of the forehead, the sides of the lower joints and the muzzle, which are white. Its horns, rising above the eyes, are black, smooth and straight for two-thirds of their length, when they suddenly curve backward. Their hoofs are admirably adapted to avail themselves of little roughnesses or projections on the mountain sides, or icy glaciers. It has long, thick and coarse hair.

What is known in the market as chamois skin is really an oil-tanned sheep or lamb-skin lining. The supply of skins from the



*Rupicapra Targus* (Chamois).

chamois animal is very limited; enough could not be obtained in a year to supply the United States for more than a single day.

The writer made special inquiry on a recent visit to Switzerland about the annual crop of this class of skins. From all that he could learn, about five thousand to six thousand skins would be a fair average yearly crop.

The accompanying wood-cut is a good representation of the chamois animal. I will also submit a specimen of one of the skins of the chamois tanned in oil. This I know to be a genuine chamois skin.

This skin is heavier than the skin of the sheep or lamb, also

much coarser. For strength and durability this skin is preferable, but for ordinary use and appearance the oil-tanned sheep-skin lining would, in most instances, be preferred.

To manufacture sheep or lamb skins into chamois leather the first step necessary is to remove the wool, which is accomplished either by painting the skin on the inside with a solution of sodium sulphite or by immersion in milk of lime.

By the former method the wool is loosened in a few hours; by the latter method it will require several days.

When the wool is loose, it is pulled off either by hand or scraped off with a dull instrument.

The skin is now again immersed in milk of lime, to swell it. It is then cleaned (beamed, as the trade calls it), to remove all fleshy particles that may adhere to it.

It is now ready for splitting. I wish to explain here that a chamois skin is really only the half of a skin. The outside, that is, that part of the skin next to the wool, known as the grain side, is not suitable for chamois leather, and is used for other purposes, mostly for hat linings, book covers, etc.

In former times, when skins were prepared for oil tannage, this part of the skin was cut away with a suitable knife and thus lost.

In our days the skin is cut through the centre (split), thus producing two skins from one—the outside, called grain or skiver, and the inside, called lining or flesher.

The splitting is accomplished on machines specially constructed for this purpose. It consists of an endless knife, the edge of which is constantly grinding to keep it sharp, the skin being passed through rollers against the sharp edge of the knife. These machines require very delicate adjustment to produce good results.

The accompanying specimen split half-way through will illustrate this process; about one-half of the skin is still the whole skin, and the other half being divided into skiver and lining.

This specimen had to be dried so as to preserve it. It will also illustrate what a raw skin looks like.

The lining or flesher is now ready for tanning. This is accomplished by sprinkling it with oil, cod-fish oil of good quality. It is important that this oil should be thoroughly incorporated into the skin. For this purpose a quantity of the skins are placed into what are known as tulling stocks, which twist and turn the skins in every direction, and distribute the oil evenly.

After sufficient milling the skins are partly dried and the process of sprinkling, milling and drying is repeated again and again until they are full of oil, and all the moisture is dried out.

They are now allowed to hang sufficiently long to thoroughly tan them at a temperature of about 100°.

The process after this is very simple. The oil is removed by pressure and the balance washed out by saponification; after this they are dried and they are then ready for finishing.

The oil, by the way, is recovered, by decomposing the soap solution with an acid and separating.

It is sold to manufacturers of other leather, it being useful to make them pliable, etc.

The finishing is done mostly by pressing the skin against revolving wheels, covered with emery or flint to remove all adhering substances and to present a finely finished surface.

We now have the finished chamois leather ready for the trimming and sorting room, where it is cut into suitable sizes and packed for the market.

Of late years a trimmed skin, that is, skins of even sizes, are preferred by the trade. For this reason most manufacturers, at least most American manufacturers, cut their skins over patterns so as to produce uniform sizes.

In former years, when England and France supplied the United States market, the skins in the same package would vary in size and shape, thus lacking uniformity.

It is true by cutting uniform sizes there is necessarily some waste, but this is reduced to a minimum, when all small pieces are again utilized, by manufacturing them into watch pockets and other small articles which find a ready sale.

The principal uses for chamois skins are for cleaning purposes. They will absorb moisture readily and give a high polish to glass, furniture and other highly polished surfaces.

A good chamois can be used either wet or dry. Quantities are also used for chest protectors, chamois vests, and even underclothes are made out of them for cold climates, also in the manufacture of other leather goods, such as purses, etc. Ladies use them for fancy work.

They can be made in all colors; formerly colors were mostly produced by applying to the surface of the skin different colored

pigments, which adhere to the leather. This produces an unsatisfactory article, however, as it will always dust more or less.

Of late years, however, manufacturers have succeeded in producing fine colors with aniline, which are more satisfactory; some specimens of colored chamois are here shown.

By incorporating a small quantity of ferric oxide, very finely powdered, an excellent polishing chamois is produced for silverware, etc.

A good quality of chamois skin is generally of a yellow or light yellow color, which, when freshly cut, should show a dark yellow color. This is a characteristic test of oil tannage. The absence of this color is generally an indication that the skin is tanned by a different method.

A good quality of oil leather should also absorb moisture readily. This test is readily applied by dropping a few drops of water on the skin; it should absorb it readily. If these drops roll about on the skin without absorption, it is almost a sure indication that it is not oil tanned.

For some purposes a very light straw-colored chamois is demanded by the trade. These are produced by bleaching with sulphur. The skins, slightly damp, are hung in an air-tight room in which a small quantity of sulphur is burned, producing a light straw-colored product of bright color. It rather weakens the skin, however, and also incorporates some sulphur, which is objectionable when used in connection with silverware.

These bleached goods should not be used for wrapping silver, as they are apt to tarnish it by producing sulphide.

The market affords a number of different brands of chamois skins. The principal ones are the American goods, the English and the French goods.

The American goods of late years have largely crowded out the imported goods, and are even now getting quite a foothold in Europe. Large quantities are now being exported principally to Germany, where they find a ready market. The English goods are generally of good quality and tannage. They come in both colors, yellow and white, the latter color being produced by bleaching.

They are trimmed and sorted mostly in irregular shapes and sizes; the French goods mostly of a dark yellow color, in large sizes. One variety, Bruts, are heavy skins finished on one side



only. This is purposely done, so that they absorb large quantities of water, thus making them suitable for stable work, carriage washing, etc. Another variety of French goods is the double dressed. These also come in large sizes only. They are very similar to the Bruts, with the difference that they are finished on both sides, making them thin like ordinary goods.

Another variety produced by American makers is what is known as steel-colored goods. These are not oil tanned goods. They are chrome leather, produced by tanning with chrome. This produces a bluish-gray-colored leather. They are very strong, and for this reason will bear more abuse than the oil-tanned goods. They may be washed with nearly boiling water without much danger of injuring them. These are preferred by some for this reason. Some are also sold on account of color for fancy work, etc.

Most manufacturers sort these skins into three qualities—first quality, second quality, and third quality, and prices are regulated accordingly. The first quality should be almost free from stitches, soft and nearly perfect. The second quality are rejects from the firsts on account of too much stitching, harsh spots and other imperfections.

The third quality are again rejects from the second quality.

The drug trade, for the sake of retaining the public opinion that only the best quality of everything is obtainable in a drug store, should handle only the first quality of goods.

Chamois skins are largely sold by the drug trade. Spring and fall are the best seasons to display them in the stores. A very attractive window display can be made with these goods.

Care should be taken, however, when used for this purpose, not to expose to sunlight, as this will very quickly bleach them, and thus render them unsightly. This does not deteriorate the quality in any other way, however.

A glass case filled with the goods, placed so that they can be seen, will keep them clean, and help to remind a woman when she enters the store that a chamois is needed in her household, and will assist materially to help sell the goods. Some druggists will keep them hidden in boxes or drawers, and produce them only when called for, with the inevitable result that their sales will be very limited.

A good quality chamois skin if properly used should last a long

time, and they can, of course, be used wet as well as dry. It is important that it is kept clean. If it is soiled, the best method of cleaning is by washing with soap and water. A liberal supply of soap is always beneficial to the skin.

The best method to prevent shrinking is to rinse it in soap suds before drying. When dry, rubbing and stretching will return it to its former softness.

Chamois skins are often abused through ignorance or inexperience. The writer has seen skins that were returned to the seller, who in turn returned them to the manufacturer, that were partly burned into charcoal, evidently caused by drying in strong heat, likely in a hot oven, others shrunk to one-fourth their natural size by being boiled or steeped in hot water.

It should be remembered that a chamois is gelatinous animal substance, a sort of oleate of gelatine, and too much heat should be avoided.

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## NOTES ON SPECIFIC GRAVITY.

BY THOMAS S. WIRGAND.

The paper of Dr. Hatcher, in a recent number of the AMERICAN JOURNAL OF PHARMACY, has called my attention to the subject of "Specific Gravity," and as the importance of a clear understanding of the subject is of such great advantage to the pharmacist, I feel no further apology is necessary for calling attention of members to the matter. Dr. Squibb, at the meeting of the American Pharmaceutical Association held in Chicago, in 1869, in a report on the Pharmacopœia, shows how valuable accurate determinations of specific gravity are in determining the quality of many of the preparations of the Pharmacopœia, and gives a description of an improved specific-gravity bottle, by which the most common errors in ascertaining specific gravity of liquids can be reduced to a minimum; but it must be borne in mind that all the ordinary weighings are approximate only unless the *absolute weight* of the bottle is taken, for all the usual weighings are made in the air and not in vacuo, and the bottle which contains one litre of water will hold 17.7 grains of air and, of course, there is this much less weight to be used as a counterpoise when the bottle is being used in taking the specific gravity of any liquid; then the temperature at which the

liquid is weighed must be taken into account, and this correction must be made for each and every liquid experimented with, as each liquid has its own rate of expansion, and this rate of expansion must be ascertained and the scale for it arranged beforehand.

The paper of Dr. Hatcher's recalls the fact that that method of taking specific gravity was shown by me to the class when I was a quiz master to the Zeta Phi Society, 1875 or '77.

An easy method of taking specific gravity of bodies soluble in water is given in "Ganot's Physics," and is as follows: Weigh the body in air, then in some liquid the specific gravity of which has been ascertained, and in which it is insoluble, and multiply its weight by the specific gravity of the liquid, then divide this product by the loss sustained when immersed in the liquid. The result is the specific gravity sought.

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## A COMPARATIVE STUDY OF ATOMIC WEIGHT TABLES.

BY M. I. WILBERT.

That the active pharmacist is interested in the present controversy on atomic weights is admitted; to what extent it might or will affect him in the ordinary routine of his business has probably not been considered.

Those of us who studied chemistry when hydrogen was 1 and oxygen always 16, do not perhaps realize the difficulties that beset the student and teacher of chemistry at the present day, when the atomic weights of the various elements vary with the text-book that is used or the table that is consulted. A great amount of work has been done in this connection in the last twenty years, and the leading chemists of the world have long ago refused to be bound by arbitrarily proposed laws; and among other things have discovered that our system of enumeration, for instance, is not necessarily a factor in chemical relations, so that instead of the various elements being related to each other in some mathematical proportion, we find that these proportions are at times fragmentary or fractional to a degree that is not at all in keeping with the average pharmacist's capacity in mental arithmetic.

But there is, no doubt, something more startling and revolutionary at the bottom of it all. There are so many physical phenomena to explain that we constantly hear of the possibility of our long-

cherished hypothesis of the atom being an entirely erroneous one, and that we will wake up some morning to a double-headed leader in the morning papers announcing the discovery, or perhaps the actual demonstration of the unity of matter and the possible transmutation of the various elementary bodies.

But what to do in the meantime is the question that is troubling many an able scientist. If we glance over the accompanying list of the elements and their corresponding atomic weights, we will realize that there is very little or no uniformity between them; and, what is more, every one will admit, that if we should use any one of these tables, the results of our computation or work would not agree with the results obtained by some one who was using one of the other tables.

But, first, a few words as to the origin of these tables. The first one is from Professor Ostwald's new book on "*Anorganische Chemie*," and, with the single exception of hydrogen, gives the same figures as the table of atomic weights in the German Pharmacopœia.

The latter book rounds out the figures for hydrogen at the second decimal, making it 1.01 instead of 1.008.

The second list, hydrogen-1, is from Professor Clark's table of comparative atomic weights (1900). It will be noted that these two tables do not exactly correspond in their relative figures, nor do they agree in all particulars with the tables published by the German Chemical Society. This particular H-1 table was chosen because it has been used in several text-books on chemistry that are now in use in this country.

The third table is taken from the Pharmacopœia of the United States for 1890.

The fourth list is from the atomic weights as given in the same standard for 1880.

In explanation we might say that niobium is duplicated under columbium, and the revised weights for didymium are given under *neo* and praseodidymium; these are matters of detail, however, and are of but secondary importance.

The important feature in connection with a comparative study of a table of this kind is a comparison of the atomic weights of the more common and, consequently, more important elements. If, for instance, we take into consideration the immense amount of work that has been done in the field of organic chemistry, confined almost

exclusively to oxygen, hydrogen, nitrogen and carbon, and compare the atomic weights as used at the present time, or those used twenty years ago, we will find that they differ but little from those given in the O-16 column. Or, if we confine ourselves to what is directly of interest to the working pharmacist, and admit that a large amount of the available chemical work has been done on the basis of the atomic weights as given in the Pharmacopœia for 1880, and then compare such common and important elements as carbon, oxygen, nitrogen, bromine, chlorine, iodine phosphorus, sulphur, potassium, sodium, calcium, magnesium, iron, lead, mercury and arsenic we will find that the weights given in the list for 1880 correspond very closely with those given in the O-16 column. This is true of all the elements enumerated above, with the single exception of magnesium, the atomic weight of which has been recalculated within the past twenty years.

But what is perhaps even more astonishing to the ordinary individual is that the atomic weights given in the Pharmacopœia of 1890 on the basis of H-1 correspond more closely to those of the O-16 series than they do to the revised H-1 tables. This is, of course, due to the fact that Morley, in 1898, showed that the proper relation of oxygen and hydrogen is as 1 to 15.875 instead of 1 to 15.96 as suggested by Lothar Meyer.

But there are still other reasons why we should, from a practical point of view, adopt O-16, and retain approximately the same molecular weights that have been used for upwards of thirty years. Among these are the facts that both the German and Swedish Pharmacopœias have already adopted the O-16 standard, and that if we should vary as much as we necessarily would, by retaining the H-1 standard, all of the new work done in these countries would not be available for us without elaborate recalculation.

Another interesting factor is found in the fact that the total decimals of all of the elements given in the table of atomic weights as published in the German Pharmacopœia is 33, while the corresponding elements in our own Pharmacopœia, or in the H-1 column, have 43, a difference of more than thirty per cent. To the ordinary mortal a saving of one-third in the necessary amount of extra calculation would appeal as being a matter of considerable moment.

After all, would it perhaps not be better to admit that chemistry is, as yet, not an exact science, but an experimental one, in which

there is material enough for all to do good work, without the constant changes that will be necessary if we insist on adhering to a standard of comparison that appears to be but poorly adapted for the purpose?

If we admit that these weights are relative rather than absolute, would it not be just as well to use O-16 or C-12 or even Hg-200, as our standard of comparison, so long as we retain approximately, within insignificant fractions, the atomic weight figures with which so much of the practical work in chemistry has been done? To the writer's mind, a policy of this kind would not only simplify the routine work of the pharmaceutical, technical or analytical chemist, it would also facilitate original work, and might contribute materially to promote the advent of that much-to-be-desired positive knowledge of the constitution and properties of matter.

	Symbol	O = 16	H = 1	U.S.P. 1890	U.S.P. 1880
	Aluminum . . . . . Al	27.1	26.9	27.04	27.
	Antimony . . . . . Sb	120.	119.5	119.6	120.
	Argon . . . . . A	39.9			
	Arsenic . . . . . As	75.	74.45	74.9	74.9
	Barium . . . . . Ba	137.4	136.4	136.9	136.8
	Beryllium . . . . . Be	9.1	9.	9.03	9.
	Bismuth . . . . . Bi	208.5	206.5	208.9	210.
	Boron . . . . . B	11.	10.9	10.9	11.
	Bromine . . . . . Br	79.96	79.34	79.76	79.8
	Cadmium . . . . . Cd	112.	111.55	111.5	111.8
	Caesium . . . . . Cs	133.	131.9	132.7	132.6
	Calcium . . . . . Ca	40.	39.8	39.91	40.
	Carbon . . . . . C	12.	11.9	11.97	12.
	Cerium . . . . . Ce	140.	138.	139.9	141.
	Chlorine . . . . . Cl	35.45	35.18	35.37	35.4
	Chromium . . . . . Cr	52.1	51.7	52.	52.4
	Cobalt . . . . . Co	59.	58.55	58.6	58.9
Nb.	Columbium . . . . . Co	94.2	93.	93.7	94.
	Copper . . . . . Cu	63.6	63.1	63.18	63.2
Nd. Pr.	Didymium . . . . . Di			142.	144.6
	Erbium . . . . . Er	166.	164.7	166.	165.9
	Fluorine . . . . . F	19.	18.9	19.	19.
	Gadolinium . . . . . Gd	156.	155.8		
	Gallium . . . . . Ga	70.	69.5	69.9	68.8
	Germanium . . . . . Ge	72.	71.9	72.3	
	Gold . . . . . Au	197.2	195.7	196.7	196.2
	Helium . . . . . He	4.			
	Hydrogen . . . . . H	1.008	1.	1.	1.
	Iodium . . . . . In	114.	113.1	113.6	113.4
	Iodine . . . . . I	126.85	125.89	126.53	126.6
	Iridium . . . . . Ir	193.	191.7	192.5	192.7

		O = 16	H = 1	1890 U.S.P.	1880 U.S.P.
Iron . . . . .	Fe	56'	55'6	55'85	55'9
Krypton . . . . .	Kr	45'			
Lanthanum . . . . .	La	138'	137'6	138'2	138'5
Lead . . . . .	Pb	206'9	205'36	206'4	206'5
Lithium . . . . .	Li	7'03	6'97	7'01	7'
Magnesium . . . . .	Mg	24'36	24'1	24'3	24'
Manganese . . . . .	Mn	55'	54'6	54'8	54'
Mercury . . . . .	Hg	200'3	198'5	199'8	199'7
Molybdenum . . . . .	Mo	96'	95'3	95'9	95'5
Neodidymium . . . . .	Nd	143'6	142'5		
Neon . . . . .	Ne	20'			
Nickel . . . . .	Ni	58'7	58'25	58'6	58'
Niobium . . . . .	Nb	94'2	93'		
Nitrogen . . . . .	N	14'04	13'93	14'01	14'
Osmium . . . . .	Os	191'	189'6	190'3	198'5
Oxygen . . . . .	O	16'	15'88	15'96	16'
Palladium . . . . .	Pd	106'	106'2	106'35	105'7
Phosphorus . . . . .	P	31'	30'75	30'96	31'
Platinum . . . . .	Pl	194'8	193'4	194'3	194'4
Potassium . . . . .	K	39'15	38'82	39'03	39'
Praseodidymium . . . . .	Pr	140'5	139'4		
Rhodium . . . . .	Rh	103'	102'2	102'09	104'1
Rubidium . . . . .	Rb	85'4	84'75	85'2	85'3
Ruthenium . . . . .	Ru	101'7	100'9	101'4	104'2
Samarium . . . . .	Sm	150'	149'2	149'62	
Scandium . . . . .	Sc	44'1	43'8	43'97	44'
Seelenium . . . . .	Se	79'1	78'6	78'87	78'8
Silicon . . . . .	Si	28'4	28'2	28'3	28'
Silver . . . . .	Ag	107'93	107'11	107'66	107'7
Sodium . . . . .	Na	23'05	22'88	23'	23'
Strontium . . . . .	Sr	87'6	86'95	87'3	87'4
Sulphur . . . . .	S	32'06	31'83	31'98	32'
Tantalum . . . . .	Ta	183'	181'5	182'	182'
Tellurium . . . . .	Te	127'	126'5	125'	125'
Terbium . . . . .	Tb	160'	158'8	159'1	
Thallium . . . . .	Tl	204'1	202'61	203'7	203'7
Thorium . . . . .	Th	232'5	230'8	231'9	233'
Thulium . . . . .	Tu	171'	169'4		
Tin . . . . .	Sn	118'5	118'1	118'8	117'7
Titaium . . . . .	Ti	48'1	47'8	48'	48'
Tungsten . . . . .	W	184'	182'6	183'6	183'6
Uranium . . . . .	U	239'5	237'8	238'8	238'5
Vanadium . . . . .	V	51'2	51'	51'1	51'3
Xenon . . . . .	X	65'			
Ytterbium . . . . .	Yb	173'	171'9	172'6	172'7
Yttrium . . . . .	Yt	89'	88'3	88'9	89'8
Ziuc . . . . .	Zn	65'4	64'9	65'1	64'9
Zirconium . . . . .	Zr	90'7	89'7	90'4	90'

THE IDENTIFICATION AND PROPERTIES OF  $\alpha$ - AND  $\beta$ -EUCAINE.<sup>1</sup>

BY CHARLES LATHROP PARSONS.

*(Concluded from page 342.)*

## MICROSCOPIC CHARACTERISTICS.

A careful examination of many of the precipitates which the various reagents yield with either of the eucaines or with cocaine failed to disclose any special characteristic of value. Many of them are beautifully crystalline and give striking displays of color with polarized light, but they vary too much with different conditions to be used with certainty as a means of identification. An examination of the alkaloids themselves as precipitated by ammonia and crystallized from chloroform also give negative results. Fortunately, however, the hydrochlorides, when pure, are easily identified under the polarizing microscope, and especially is cocaine hydrochloride recognizable at once.

The slides are best prepared by allowing a drop of an aqueous solution to spontaneously evaporate. Cocaine under these conditions does not always crystallize at once even when quite dry. But if set aside for a few hours the crystals will form and the peculiar feathery and fan-shaped radiations, resembling very closely those seen on a broken nodule of wavellite, are recognizable even with the naked eye. The examination is most satisfactorily performed with a magnifying power of about 250 diameters.

$\alpha$ -Eucaine hydrochloride in saturated solution tends to crystallize in little spots which, under polarized light, look like very highly colored rosettes made up of very small crystals, so that the field is always bright, never showing any constancy of extinction directions. On edges of drop, the rosettes sometimes show small feathery forms of crystals of which the extinction directions vary but are more often diagonal. A 5 per cent. solution gives much the same result. The rosettes frequently appear to be made up of concentric rings of very small crystals, the centre of rosettes being thicker than edges, and only the edges showing plate or feather forms large enough to be examined as individuals. Interference colors are very bright. When crystallized from dilute solution the rosette forms may

<sup>1</sup> Read at the Denver meeting of the American Chemical Society, August 29, 1901, and reprinted from the *Jour. Amer. Chem. Soc.*, 1901, p. 885.



become very small and numerous, covering the entire field, while the interference colors are only gray or black. The forms of gray and black overlying feathers are at times very prominent in  *$\alpha$ -eucaïne*, and resemble nothing so closely as the small feathers of Plymouth Rock poultry.

*$\beta$ -Eucaïne* hydrochloride from saturated solution shows broad feathery or fern-like forms, sometimes blade-like or tabular. Usually the tabular forms show concentric rings of high color around the edges and the extinction directions are easily determined. They are usually slightly oblique to the main axis of the crystal, but different crystals show two separate angles of extinction, one being the complement of the other and due to the fact that the individuals are viewed from opposite sides. The forms already mentioned are more apt to be found around the outer edge of the evaporated drop, while the centre is made up of isolated individuals which show brilliant tabular and prismatic forms, sometimes quite small and rod-like. Rarely they are diamond-shaped. These diamond-shaped forms sometimes show extinction directions symmetrical to the main axis, but more often slightly oblique. The individual crystals are large and much more easily studied than those of  *$\alpha$ -eucaïne*. If more dilute solutions of less than 1.5 per cent. are used, the characteristics do not come out so plainly, the crystal forms being smaller and showing very low interference colors, mainly light grays. Also these sometimes show feathery forms and rosette forms something like  *$\alpha$ -eucaïne*.

Cocaine hydrochloride in 10 per cent. to 1 per cent. solution crystallizes in fan-like shapes. A 2 per cent. solution gives a solid field of radiating forms, the individuals of which resemble very closely the forms sometimes seen on a frosted window. Extinction is parallel and perpendicular to the main axis of the crystals. Colors are brilliant and the whole field is characteristic, enabling one to distinguish cocaine immediately. With dilute solutions the fan-like shapes are still marked, but the field is sometimes broken and interference colors are a slow order of light grays.

In conclusion it is perhaps well to suggest that in working on unknown substances all tests for eucaïne and cocaine, as with other alkaloids, are much more valuable when compared with those of samples whose identity is known.

## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

PROCEEDINGS OF THE AMERICAN PHARMACEUTICAL ASSOCIATION at the Forty-ninth Annual Meeting, held at St. Louis, Mo., September, 1901. Also the Constitution, By-Laws and Roll of Members. Baltimore, 1901.

While an abstract of the proceedings of the last meeting of this Association has been published in many of the pharmaceutical and drug journals, this should only cause greater interest in the official records of the Association, containing as they do not only the papers in full, but the discussions which were in some cases most profitable and interesting. The progressive worker only requires a hint to enlarge the sphere of his activity and make more effective the work he is doing. In the 500 pages of the Proceedings are many hints for not only the teacher and manufacturer, but the retail pharmacist as well. Probably no previous issue of the Proceedings has contained so much in the line of modern drug-store methods, particularly applicable to the work of the retail pharmacist, as the volume now referred to.

The "Report on the Progress of Pharmacy," by Professor Diehl, serves to enhance the value of the volume, and one may well ask: Where is there such a repository of information of the year's progress as in the Proceedings of the American Pharmaceutical Association?

THE ELEMENTS OF PHYSICAL CHEMISTRY. By J. Livingston R. Morgan. Second edition, revised and enlarged. X + 352 pp., 12mo, cloth, \$2.00. New York: John Wiley & Sons. London: Chapman & Hall, Limited. 1902.

Applied as well as pure chemistry is dependent for its returns upon the principles of physical chemistry. The labors of Ostwald, Le Blanc, Nernst and others have caused almost a revolutionary aspect in regard to the nature of solutions, chemical reactions and the rôle of ions in analytical chemistry. These subjects being comparatively new, many persons are unable to obtain a comprehensive outline of the subject, owing to the length of time which is necessary to spend upon the separate volumes devoted to these subjects. This volume is especially intended as a text-book for either class-work or self-instruction, and although calculus is used in the derivation of some of the laws, still much can

be done without any training in the higher mathematics. In general, references are given, so that any one wishing to make an extended study of any special portion may do so with little difficulty. The amount of the subject included, however, embraces all that which is likely to be useful to all chemists.

In the preparation of the second edition the author has endeavored to do three things: (a) To bring the subject-matter itself up to date; (b) to make, wherever possible, the relations clearer than before; (c) to make the book itself more useful to those studying the subject without an instructor. The physical meaning of all relations is shown, so that those who have not sufficient mathematical training to actually derive the single relations will at least understand them and be able to apply them when necessary. Following the advice of Professor Ostwald, the chapter on the rôle of the ions in analytical chemistry has been given a place in Chapter VII between chemical equilibrium and kinetics. In Chapter X a collection of problems is given which will show the value and application of each important relation considered. This collection will be particularly acceptable to those studying alone, as well as to others who have already studied the subject, but not yet attempted to apply it.

The following subjects are treated in the respective chapters: (1) Physical chemistry, energy, the factors of energy and the methods for the determination of the atomic weight; (2) the gaseous state; (3) the liquid state; (4) the solid state; (5) solution; (6) thermochemistry; (7) chemical change, (a) equilibrium, (b) the rôle of ions in analytical chemistry, (c) chemical kinetics; (8) the phase-rule and the equilibrium of water in its phases; (9) electrochemistry, the migration of the ions, the conductivity of electrolytes, electromotive force, electrolysis and polarization; (10) problems showing the value and application of the chapters considered.

The book is to be commended most heartily to every one having an interest in the principles of chemistry.

INDICATORS AND TEST-PAPERS. By Alfred I. Cohn. Second edition, revised and enlarged. \$2.00. New York: John Wiley & Sons; London: Chapman & Hall, Limited, 1902.

The first edition of this book was favorably reviewed in this JOURNAL for January, 1900. In the second edition the work has been

brought up to date by the addition of an appendix, embodying the information on the indicators introduced since the appearance of the first edition. In this list are mentioned: alizarin green B, ammoniacal copper solution, corallin—malachite green, diazoparanitraniline—propylmetacresol, iron isopyrotritarate, iron salicylate, patent blue L, perezol, potassium ferrocyanide with ammonium molybdate, and sodium alizarinsulphonate.

The work is systematically arranged, reliable, and a practical guide for the laboratory worker, as well as a ready means of reference to all desiring any information on the source, preparation and application of indicators and test-papers, as well as their tests for sensitiveness.

A LABORATORY GUIDE TO THE STUDY OF QUALITATIVE ANALYSIS. By E. H. S. Bailey and Hamilton P. Cady. Fourth edition. 12mo, 235 pp., cloth, \$1.25 net. Philadelphia: P. Blakiston's Son & Co., 1901.

While there are many manuals on qualitative analysis, still any work in which are considered the more modern theories underlying analytical chemistry, and which attempts to present some new facts and investigations, is very much desired. In the present work the authors apply the dissociation theory of Arrhenius and the law of mass action as enunciated by Gulberg and Waage in correlating and interpreting chemical phenomena, and give a new method for the separation of arsenic, antimony and tin and also for the separation and identification of the acids.

The properties of the metals and precipitates with the special tests, blowpipe reactions are given and numerous notes of special precautions are interspersed in the text. The methods of separation of the ions and various groups, as also the special methods for examining unknown substances, are also valuable.

The book is distinctly a modern one and is inspired by the several foundation works of Ostwald in inorganic and analytical chemistry. It is an interesting and valuable work on qualitative analytical chemistry.

DIE ROHSTOFFE DES PFLANZENREICHES. Versuch einer technischen Rohstofflehre des Pflanzenreiches. Von Dr. Julius Wiesner. 2te gänzlich umgearbeitete und erweiterte Auflage. 7. Lieferung (Bd. II, Bogen 11–20); 8. Lieferung (Bd. II, Bogen 21–30). Mit Textfigur 45–75. Leipzig: Verlag von Wilhelm Engelmann, 1901–1902.

As has already been stated in previous reviews of the second revised and enlarged edition of Wiesner's "Raw Materials of the Plant Kingdom," it is not only the production of Dr. Wiesner, but of twelve other collaborators. Most of Parts VII and VIII are devoted to the consideration of the fibres. A small portion of Part VII contains the end of the chapters on Woods and a few pages of Part VIII contain an introduction to the root and rhizome products of plants.

The fibres are treated as follows: (1) Anatomischer Bau der Fasern; (2) Die physikalischen Eigenschaften der Fasern; (3) Chemische Eigenschaften der Fasern; (4) Die Kennzeichen der Fasern; (5) Uebersicht der Faserpflanzen; (6) Uebersicht der nachfolgend abgehandelten technisch verwendeten Pflanzenfasern.

These parts, like those previously reviewed in this JOURNAL, reflect great credit upon the authors, and the work when complete will be indispensable to all those interested in the technical products of the plant kingdom.

DIGEST OF CRITICISMS ON THE UNITED STATES PHARMACOPOEIA. Seventh Decennial Revision (1900). Part III, comprising abstracts of papers up to May 15, 1901.

Part II of the Digest of Criticisms contained abstracts from accessible literature to January 1, 1898. This part was the last compiled by the late Hans M. Wilder. Shortly after Mr. Wilder's death (January 25, 1901), the late Dr. Charles Rice, Chairman of the Committee of Revision, requested Prof. Henry Kraemer to take charge of the preparation of Part III, the work to be done by Florence Yapple, Ph.G., Philadelphia. This part includes the abstracts of pharmaceutical literature during the years 1898, 1899 and 1900, and as much of the literature of 1901 as could be arranged by May 15th without further delaying the work, and was prepared in less than four months. Any one desiring a copy of Part III of the Digest of Criticisms may obtain the same by addressing Prof. Joseph P. Remington, Chairman of the Revision Committee, and forwarding six cents per copy to cover the amount of postage.

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## PHARMACEUTICAL MEETING.

The seventh of the series of pharmaceutical meetings of the Philadelphia College of Pharmacy for 1901-1902 was held on Tuesday,

April 15th. Mr. Joseph W. England, Curator of the Museum, presided. The first paper read was "Notes on Specific Gravity," by Thomas S. Wiegand, the Librarian of the College (see page 230). In discussing the paper Mr. Gustavus Pile said that for the ordinary determination of specific gravity of liquids, the use of the hydrometer was more easily understood and applied than a balance, and more accurate than a specific gravity bottle. It was possible with the hydrometer possessing a large bulb and small stem to have the graduations sufficiently delicate to detect a variation of the fifth of a grain. One of the most serious difficulties in taking specific gravity is that occasioned by the variation in temperature, and the speaker favored the adoption of one temperature rather than having two standard temperatures, viz.: 39° and 60°. He said that in the construction of hydrometers everything depended upon having a correct standard of comparison. All other instruments are then made from this and the rulings made from tables which have been previously worked out. Mr. Pile further said that the displacement of air was not as great a source of error as is generally supposed, and that any two liquids will displace nearly the same amount of air.

The next paper was on "Chamois Skins," by Charles C. Drueding (see page 224). The paper was illustrated with a large number of commercial varieties which showed the steps in their preparation for the market.

The discussion on the definition of the term spoonful and its metric equivalent was opened by M. I. Wilbert (see page 218). Mr. England said that apparently no one had so exhaustively gone into this subject before as Mr. Wilbert, and that a campaign of education seemed necessary to overcome the prevailing customs and notions on these subjects. He suggested that some of the difficulties might be overcome by the physician writing "a teaspoon *even* full" or a "teaspoon *heaping* full." Mr. C. Carroll Meyer did not favor this suggestion, as he considered that it would add to the length of the directions on the label and that this was considerable, particularly when medicines were dispensed in half- or one-ounce bottles. Mr. George M. Beringer said that the physician calculates the doses of the prescription in one, two and four fluid drachms, and that while we cannot influence the size of spoons, yet we can make suggestions to the manufacturer of medicine glasses. He further said that he had in

mind the construction of a graduate as a medicine glass in which the lower part was conical and graduated, and the upper part so constructed as to facilitate the administration of the medicine. He further said that we ought not to introduce the transposition of doses, and that we ought to endeavor to carry out the decimal measures on graduates independent of their spoon equivalents. Mr. Meyer said that he believed that the people will continue to use spoons in measuring medicines. Mr. E. M. Boring considered that the physician could control the subject more than any one else and could influence the use of medicine glasses. Miss Anna C. Ross, P.D., alluded to some of the troubles connected with the subject in dispensary work. Mr. Wilbert, in closing the subject, said that in using teaspoons, metric equivalents were closely approximated. He offered the following resolutions, which, with the amendments as finally adopted, are herewith given:

WHEREAS, it is desirable to secure greater accuracy and more uniformity in the measuring out or administration of doses of liquid medicines.

*Therefore, be it Resolved*, That we, members of the Philadelphia College of Pharmacy, assembled at this pharmaceutical meeting, recommend the use of accurately graduated glass dose measures; these measures to be constructed so that the height of the contained liquid, at a spoonful mark, is greater than its diameter.

*Resolved*, That for use in connection with spoons as dose measures, we recommend the promulgation of the following definition taken from the French Codex:

"A spoon is full when the liquid it contains comes up to, but does not show a curve above, the upper edge or rim of the bowl."

*Resolved*, That for use in connection with the metric system of weights and measures, we recommend the adoption of the following approximate equivalents of spoonfuls.

1 teaspoonful equals 5 c.c.

1 dessertspoonful equals 2 teaspoonfuls or 10 c.c.

1 tablespoonful equals 3 teaspoonfuls or 15 c.c.

*Resolved*, That a copy of these resolutions be sent to the chairman of the Committee on the Metric System of the American Pharmaceutical Association and the secretaries of the American Medical Association and Philadelphia County Medical Society, for the purpose of their consideration and the securing of uniform action on this subject.

Mr. William McIntyre said that inasmuch as it was proposed in the report of the Committee on Pharmaceutical Meetings at the annual meeting of the College, to provide a permanent fund for carrying on these meetings, he desired to give \$65.00 additional

to what he had already given to the committee, thus making his contribution to this fund \$100.00. Mr. McIntyre's gift was accepted and a unanimous vote of thanks was tendered him.

At the next meeting, on May 20th, which will be the last of the present series, an interesting programme will be presented.

H. K.

## PHILADELPHIA COLLEGE OF PHARMACY.

### THE EIGHTY-FIRST ANNUAL COMMENCEMENT.

The exercises connected with conferring the degrees of Doctor of Pharmacy and Pharmaceutical Chemist were held in the Academy of Music, Thursday evening, April 17th. Prayer was offered by Rev. Edgar Cope. The degrees were conferred by the President, Howard B. French. The following received the degree of Doctor of Pharmacy (P.D.):

<i>Name.</i>	<i>Subject of Thesis.</i>	<i>State.</i>
Ackerman, William Brown,	<i>Some Notes on the Morphology and Cultivation of Digitalis,</i>	Pennsylvania.
Alston, William Algernon,	<i>Cinchona,</i>	S. Carolina.
Baer, Herbert Oscar,	<i>Liquor Ferri Chloridi,</i>	W. Virginia.
Beegle, David Elmer,	<i>Suprarenal Glands,</i>	Pennsylvania.
Berberich, Joseph Herman,	<i>Morphine and its Antidotes,</i>	Germany.
Binder, Arthur Henry,	<i>Cereus Grandiflorus,</i>	Pennsylvania.
Blew, Robert St. Clair,	<i>Arsenic and its Antidote,</i>	New Jersey.
Blough, Elijah Robert,	<i>Cultivated Hydrastis,</i>	Pennsylvania.
Borneman, John Alexander,	<i>Naturalization of Medicinal Plants in the United States,</i>	Germany.
Brookes, Virginia Cade, P.C.	<i>Mesquite Gum,</i>	Texas.
Brown, Horsey Pierce,	<i>Antidiphtheritic Serum,</i>	Delaware.
Caden, Alice Beatrice,	<i>The Valuation of Pepsin with Dried Egg Albumen,</i>	Kentucky.
Catlin, Joseph Albert,	<i>Cannabis Indica,</i>	Maryland.
Clemmer, John Krupp,	<i>Aloin,</i>	Pennsylvania.
Craven, Alfred Young,	<i>Heroin,</i>	Pennsylvania.
Crawford, Thomas Foster,	<i>Iodine,</i>	Scotland.
Croft, Clarence,	<i>Aloes,</i>	Pennsylvania.
Crothers, Anthony Brooks,	<i>Kaolin,</i>	Maryland.
Dickinson, Ralph Brinton,	<i>Cocaine Hydrochloras,</i>	Pennsylvania.
Douglass, John Xavier	<i>Smokeless Powder and its Advantages,</i>	Pennsylvania.
Downs, William Joseph,	<i>Nux Vomica,</i>	Pennsylvania.
Dulaney, Joseph Field,	<i>Nutrient Gelatin and Agar-Agar Media,</i>	Texas.
Eckels, Nathaniel Ort,	<i>Emulsion of Terebene,</i>	Pennsylvania.
Evans, Thomas John,	<i>Aqua Hydrogenii Dioxidi,</i>	Pennsylvania.
Eves, Charles Scott,	<i>The Hypophosphites,</i>	Pennsylvania.
Evvard, John Joseph,	<i>Coal Tar Products,</i>	Pennsylvania.



Name.	Subject of Thesis.	State.
Fetterolf, Clarence F. G.,	<i>Xanthium Canadense</i> ,	Pennsylvania.
Filman, Walter Theodore,	<i>Oleum Santali</i> ,	Pennsylvania.
Fitch, James Clarence,	<i>Fat-free Tincture of Digitalis</i> ,	Pennsylvania.
Fleischer, William Paul,	<i>The Different Varieties of Ipecac</i> ,	Pennsylvania.
Fox, Irvin Berry,	<i>The Economics of a Retail Pharmacist Collecting and Powdering his own Crude Drugs</i> ,	Pennsylvania.
Fox, Joseph Peter,	<i>Cascara Sagrada</i> ,	Pennsylvania.
Fried, Percy,	<i>Urotropin</i> ,	Pennsylvania.
Gamer, Albert Charles C.,	<i>Public Sanitation</i> ,	California.
Gehringer, Edwin Franklin,	<i>Sodii Chloridum</i> ,	Pennsylvania.
Geron, Yeatman,	<i>Ergota</i> ,	Alabama.
Gettel, John Ralph Elsrode,	<i>Rhamnus Purshiana</i> ,	Pennsylvania.
Gliem, Harry Charles,	<i>Therapeutics of Digitalis</i> ,	Pennsylvania.
Goodman, Edith Morton,	<i>Diphtheria Antitoxin; its Preparation and Recognition by the Pharmacopœia</i> ,	Colorado.
Goring, Myatt Edward,	<i>Pepsinum</i> ,	New York.
Grove, Harry Ross,	<i>The Physiological Action and Therapeutic Uses of Ergot</i> ,	Pennsylvania.
Handwork, Francis Collins,	<i>Official Medicinal Plants growing in the vicinity of Philadelphia</i> ,	Pennsylvania.
Heffelfinger, Wm. Edward,	<i>Administration of Cod Liver Oil</i> ,	Pennsylvania.
Hendrickson, Raymond,	<i>Nutgall Ink</i> ,	California.
Hertzler, Norman Eberly,	<i>Pyroxylinum</i> ,	Pennsylvania.
Hertzler, Oliver Henry,	<i>Acetic Acid as a Menstruum in the Manufacture of Fluid Extracts</i> ,	Pennsylvania.
Hilliard, Bayard,	<i>Apomorphine Hydrochlorate</i> ,	New Jersey.
Jones, Howard Harlan,	<i>Acidum Gallicum</i> ,	Pennsylvania.
Kellar, William Albert,	<i>Eucaïne and its Salts. Eucaïne Hydrochlorate</i> ,	Colorado.
Kirk, Frank Hall,	<i>Petroleum and its Therapeutic Uses</i> ,	Pennsylvania.
Knabb, Daniel Milton,	<i>Syrupus Hypophosphitum</i> ,	Pennsylvania.
Knauss, Howard James,	<i>Acidum Carbolicum</i> ,	Pennsylvania.
Kyle, Christian Bauer,	<i>Acetone</i> ,	Pennsylvania.
Lescure, Anna Rosalie,	<i>Disinfectants and Antiseptics</i> ,	Pennsylvania.
Levering, John Hartrauft,	<i>Liquor Potassii Arsenitis</i> ,	Pennsylvania.
Lewis, Herbert Willard,	<i>Olive Oil Adulteration</i> ,	Massachusetts.
Lide, Leighton Elba,	<i>The Manufacture of Cotton Seed Oil</i> ,	Mississippi.
McGarrah, Wm. Henry, Jr.,	<i>The Art of Filling Capsules</i> ,	Pennsylvania.
MacGregor, Albert Dell,	<i>Tests for the Identification of Formaldehyde in Milk and Food</i> ,	Illinois.
McLaughlin, Harry A.,	<i>Peppermint and Spearmint</i> ,	Pennsylvania.
Marcus, Simon,	<i>Phytolacœ Radix</i> ,	Pennsylvania.
Margolin, Fannie Bezman,	<i>Petroleum</i> ,	Russia.
Martin, Charles Edward,	<i>Kaolin</i> ,	Pennsylvania.
Martin, Frederick Adam,	<i>Acidum Benzoicum</i> ,	New Jersey.
Matlack, Walter Ball,	<i>Digitalis and its Preparations</i> ,	New Jersey.

Name.	Subject of Thesis.	State.
Meals, Ira Dale,	<i>Zinc Oxide,</i>	Pennsylvania.
Meredith, Wilbur Curtis,	<i>Digitalis,</i>	Pennsylvania.
Metzler, Oscar LeRoy,	<i>Cocillana,</i>	Pennsylvania.
Myers, Luther Melancthon,	<i>Pepsinum,</i>	Pennsylvania.
Oberly, John S.,	<i>Ginseng and its Cultivation,</i>	Pennsylvania.
Parker, James Heber,	<i>The Estimation of Formaldehyde,</i>	Pennsylvania.
Penrose, Thos. Wm., P. C.,	<i>Distilled Water,</i>	Pennsylvania.
Quinn, Vincent DePaul,	<i>Cinchona,</i>	Pennsylvania.
Ramsaur, David Wilfong,	<i>Serenoa Serrulata,</i>	Florida.
Reeve, Alfred Warffuell,	<i>Comparative Solubility of the Chemi-</i> <i>cals of the U.S.P. and the B.P.,</i>	New Jersey.
Reice, Isaac Stephen,	<i>Belladonna,</i>	Pennsylvania.
Rhodes, Geo. Washington,	<i>The Physician and the Pharmacist,</i>	Maryland.
Robinson, David Crogman,	<i>Strophanthus,</i>	Pennsylvania.
Robinson, Thos. H., Jr.,	<i>Unguentum Zinci Oxidi,</i>	Virginia.
Roeder, Maurice Albert,	<i>Syrup of Tolu,</i>	Pennsylvania.
Rudolph, Harold Clarence,	<i>Vaccine Virus,</i>	Pennsylvania.
Schmidt, Oscar Carl,	<i>Liquor Magnesii Citratis,</i>	Pennsylvania.
Shenkle, Albert Philip,	<i>Gentiana,</i>	Pennsylvania.
Slobig, Charles Henry,	<i>Petroleum,</i>	Pennsylvania.
Smith, Alfred Homer,	<i>Codeina,</i>	Delaware.
Smith, Henry William,	<i>Copper,</i>	Pennsylvania.
Smith, Wm. David Harris,	<i>A comparison of the several parts of</i> <i>Cassia Marilandica with the Leaf-</i> <i>lets of Cassia Acutifolia,</i>	Tennessee.
Soken, Joseph Louis,	<i>Argon,</i>	Russia.
Strauss, Robert Franklin,	<i>Podophyllum,</i>	Pennsylvania.
Stuver, Henry William,	<i>Emulsion of Liquid Petroleum,</i>	Colorado.
Swartz, William Luther,	<i>Pills and their Excipients,</i>	Pennsylvania.
Thomas, George Carroll,	<i>Guarana,</i>	Pennsylvania.
Toulson, John Milburn,	<i>Phytolacca,</i>	Maryland.
Tyler, Ephraim Shaw,	<i>The Opium Preparations of the</i> <i>U.S.P.,</i>	New Jersey.
Ulrich, Ralph Thomas,	<i>What is a Fruit?</i>	Pennsylvania.
Weidemann, Geo. B., B. S.,	<i>Tinctura Opii Deodorata,</i>	Pennsylvania.
Weigester, Wilson,	<i>Gonococcus,</i>	Pennsylvania.
Welch, William Herbert,	<i>Tannic Acid,</i>	Pennsylvania.
Williams, Morrison Patton,	<i>Official Plants of the Labiatæ,</i>	N. Carolina.
Wilson, Oscar Hermon,	<i>Cinchona,</i>	Pennsylvania.
Winkler, Max Erwin,	<i>An Antidote Cabinet,</i>	Pennsylvania.
Wisegarver, Oscar Kline,	<i>Biological Products,</i>	Pennsylvania.
Woodill, Robert Franklin,	<i>Urine Analysis by Pharmacists,</i>	Massachusetts.
Worthington, J. W. Wolf,	<i>Mercury with Chalk,</i>	Pennsylvania.
Ziegler, Charles Norman,	<i>Oleum Morrhuæ,</i>	Pennsylvania.
Ziegler, Wm. Lodge, Jr.,	<i>Maltum,</i>	Pennsylvania.

The following received the degree of Pharmaceutical Chemist (P.C.) :

Name.	Subject of Thesis.	State.
Baker, Daniel,	<i>Fat-free Tincture of Strophanthus,</i>	Pennsylvania.
Miller, Roy Leonard,	<i>Assay of Extractum Nucis Vomicae,</i>	Maryland.

ANNOUNCEMENT BY THE DEAN. Prof. Joseph P. Remington stated that an unusually high average had been attained by the members of this class, and that the President's cup, offered by Howard B. French, was awarded them and would be held by them until some succeeding class should attain a higher grade of scholarship. The following received the grade of distinguished: Daniel Milton Knabb, John S. Oberly, James Heber Parker, William David Harris Smith, Morrison Patton Williams, Oscar Hermon Wilson, Joseph Field Dulaney. The following were meritorious: Albert Charles C. Gamer, John Milburn Toulson, William Herbert Welch, J. Warren Wolf Worthington.

THE VALEDICTORY ADDRESS was delivered by Hon. Charles Emory Smith, ex-Postmaster-General. After briefly reviewing the history and work of the College, Mr. Smith alluded to the beneficent work of the apothecary since the time of Hippocrates, and in this connection made a number of quotations from the classics. In closing he urged the graduates to be thorough in all they did and masters of their work; thoroughness with tact and common-sense he considered were the requisites for a successful life.

#### AWARD OF PRIZES.

THE PROCTER PRIZE of a gold medal and certificate for the highest grade of scholarship and meritorious thesis was awarded to David Wilfong Ramsaur, and presented by Howard B. French.

THE WILLIAM B. WEBB MEMORIAL PRIZE of a gold medal and certificate, offered by Mrs. Rebecca T. Webb for the highest general average in the examinations of the Committee, Operative Pharmacy and Specimens, was awarded to Daniel Milton Knabb and presented by William J. Jenks. The following graduates received honorable mention in connection therewith: David Wilfong Ramsaur, William David Harris Smith.

THE CHEMISTRY PRIZE of \$25, offered by Prof. Samuel P. Sadtler, for original work in quantitative analysis, was awarded to James Heber Parker, the following graduates receiving honorable mention in connection therewith: Raymond Hendrickson, Roy Leonard Miller.

THE MATERIA MEDICA PRIZE of \$25, offered by Prof. C. B. Lowe, for the best examination in Materia Medica, the recognition of Materia Medica specimens, and a meritorious thesis, was awarded to John S. Oberly, the following receiving honorable mention in connection therewith: Daniel Milton Knabb, James Heber Parker, Alfred Homer Smith, William David Harris Smith, Oscar Hermon Wilson, J. Warren Wolf Worthington.

THE ANALYTICAL CHEMISTRY PRIZE of \$25, offered by Prof. F. X. Moerk, for the best special examination in quantitative and qualitative analysis by students receiving the grade of "very satisfactory" in both the second and third years, was awarded to James Heber Parker, the following receiving honorable mention in this connection: Wilbur Curtis Meredith, David Wilfong Ramsaur, William David Harris Smith, Oscar Hermon Wilson.

THE MAISCH PRIZE of \$20, offered by Mr. J. H. Redsecker, of Lebanon, Pa., for histological knowledge of drugs, was awarded to Oliver Henry Hertzler, and presented by Prof. Henry Kraemer, the following graduates receiving honorable mention in connection therewith: James Clarence Fitch, Albert Charles C. Gamer, Daniel Milton Knabb, David Wilfong Ramsaur, William David Harris Smith, Morrison Patton Williams.

THE OPERATIVE PHARMACY PRIZE of \$20, offered by Prof. J. P. Remington, for the best examination in operative pharmacy, was awarded to J. Warren Wolf Worthington, the following graduates receiving honorable mention in this connection: William David Harris Smith, Daniel Milton Knabb, John Alexander Bornemann, David Wilfong Ramsaur, Howard James Knauss, Leighton Elba Lide, John Milburn Toulson, Yeatman Geron, Charles Scott Eves, Henry William Stuver, William Edward Heffelfinger, William Luther Swartz, Herbert Willard Lewis, John S. Oberly.

THE THEORETICAL PHARMACY PRIZE, consisting of a fine Troemner agate prescription balance, offered by Mr. M. N. Kline, for the best examination in theory and practice of pharmacy, was awarded to William David Harris Smith, and presented by Dr. C. A. Weidemann, the following receiving honorable mention in connection therewith: Daniel Milton Knabb, Albert Dell MacGregor, James Heber Parker, David Wilfong Ramsaur, George Buzby Weidemann, Wilson Weigester, William Herbert Welch, Oscar Kline Wisegarver.

THE INSTRUCTORS' PRIZE of \$20, offered by the instructors for the highest term average in the branches of pharmacy, chemistry and materia medica, was awarded to John S. Oberly, and presented by Dr. J. L. D. Morison, the following graduates receiving honorable mention in connection therewith: James Heber Parker, William David Harris Smith, Oscar Hermon Wilson, Morrison Patton Williams, J. Warren Wolf Worthington, Albert Charles C. Gamer, David Wilfong Ramsaur, Joseph Field Dulaney.

THE COMMERCIAL TRAINING PRIZE of \$20, offered by Prof. J. P. Remington, for the best examination in this branch, was awarded to Edith Morton Goodman, and presented by Dr. A. W. Miller, the following graduates receiving honorable mention in connection therewith: William Brown Ackerman, Herbert Oscar Baer, David Elmer Beegle, Nathaniel Ort Eckels, John Joseph Evrard, Albert Charles C. Gamer, Leighton Elba Lide, Albert Dell MacGregor, Frederick Adam Martin, John S. Oberly, James Heber Parker, David Wilfong Ramsaur, John Milburn Toulson, George Buzby Weidemann, Max Erwin Winkler, William Lodge Ziegler.

#### COMPLIMENTARY SUPPER OF THE FACULTY.

A complimentary supper was given to the graduating class by the members of the Faculty on Wednesday evening, April 16th, in the Museum of the College. Some of the officers and trustees of the College were present, as also other invited guests. The grade of scholarship attained by this class being higher than that of the class last year, they were entitled to receive the President's cup. It was presented by the donor, Howard B. French, and received on behalf of the class by a specially selected committee.

Professor Remington acted as toastmaster, and toasts were responded to by the members of the Faculty and instructors, some of the members of the College and Board of Trustees, and by many of the members of the graduating class. The latter took this occasion to present Dr. J. L. D. Morison, retiring instructor in Materia Medica, with a watch-fob as a mark of their esteem.

#### BACCALAUREATE SERMON.

The baccalaureate services were held this year, as last year, in Christ Church, the sermon being delivered by the rector, the Rev. Dr. C. Ellis Stevens.

## THE ALUMNI ASSOCIATION.

The thirty-eighth annual meeting of the Alumni Association was held in Alumni Hall, on Tuesday afternoon, at 2.30 o'clock, April 15th, with the President, John H. Hahn, in the chair.

Following the annual address of the President, reports from the officers and standing committees were read. The following officers were elected for the ensuing year: President, William G. Nebig; Vice-Presidents, Albert Oetinger and Jacob M. Baer; Treasurer, C. Carroll Meyer; Recording Secretary, William E. Krewson; Corresponding Secretary, Walter A. Rumsey; Board of Directors, John D. Burg, E. F. Cook, C. H. LaWall, William T. England and Rolland H. French.

The thirty-eighth annual reception was held in the evening of the same day in the College Museum, William G. Nebig, the newly-elected President, presiding. After the roll call by the Secretary, William E. Krewson, of new members elected during 1901-1902, they were addressed by Dr. Adolph W. Miller. The prizes offered by the Association were presented as follows:

The Alumni gold medal for the best general average of the Class of 1902 was presented by William G. Nebig to David Wilfong Ramsaur.

The Alumni prize certificates to the members of the class receiving the highest averages in each of the following branches were presented by Mahlon N. Kline:

Pharmacy, to Wm. David Harris Smith; Chemistry, to Morrison Patton Williams; Materia Medica, to John S. Oberly; General Pharmacy (Committee), to J. Warren W. Worthington; Operative Pharmacy, to J. Warren W. Worthington; Analytical Chemistry, to Joseph F. Dulaney; Specimens, to William Herbert Welch.

The Alumni silver medal was awarded to Chester Augustus Billedoux, for the best general average in the second year examination, and presented by Walter A. Rumsey.

The Alumni bronze medal was awarded to Miss Millicent Saxon Renshaw, for the best general average in the first year examination, and presented by Jacob M. Baer.

The class oration was given by Charles E. Martin; the poem by Alfred Y. Craven; the history by Wm. D. H. Smith, and the prophecy by M. A. Roeder.

## EXAMINATION QUESTIONS.

The following is a copy of the questions given to the students of the Third-Year Class at their recent examinations. The examinations in Operative Pharmacy and Analytical Chemistry were practical, and were conducted in the respective laboratories; the others were written.

### THEORY AND PRACTICE OF PHARMACY.

A—(1) How many pounds of 10 per cent. Ammonia Water (sp. gr. 0.960) can be made from 1 gallon of 28 per cent. Ammonia Water (sp. gr. 0.900)? (2) What are the U.S.P. requirements for the strength of Opium? (3) How many c.c. of Tincture of Opium assaying 1.4 per cent. morphine can be made from 50 oz. av. of Powdered Opium assaying 15.5 per cent. morphine?

B—Give the unabbreviated official or Latin name, ingredients, brief outline of process, and describe the appearance of blue ointment, compound chalk

powder, Lugol's solution, Zittman's decoction, carren oil and aromatic syrup of rhubarb.

*C*—Give the English name, ingredients, brief outline of process and describe the appearance of *syrupus acidi hydriodici*, *tinctura opii deodorati*, *spiritus ætheris nitrosi*, *linimentum belladonnæ*, *vinum ferri amarum* and *unguentum chrysarobini*.

*D*—(1) When and by whom was vaccination first introduced? (2) What observation was made by the discoverer which led to the original introduction of vaccination? (3) Describe the modern methods of preparing vaccine virus, stating the precautions necessary to guard against contamination from dangerous impurities.

*E*—(1) What is the difference between a Cerate and an Ointment? (2) State the circumstances under which a physician would select the following vehicles for external application: Lard, Hydrous Wool Fat, Oleic Acid, Petrolatum, Cerate. (3) What methods have been used to prevent or delay rancidity in fats? (4) What is the most effective method of preparing lard for pharmaceutical purposes so as to secure absence of odor and a proper consistency? (5) What are the advantages of collapsible tubes for dispensing ointments?

*F*—(1) Describe three kinds of gelatin capsules and state their uses. (2) How are capsules for holding liquids made? (3) How may each kind of capsule be filled by the apothecary?

*G*—(1) What is the object of pharmaceutical legislation? (2) What should be the qualifications of a Board of Pharmacy? (3) Why is there not a United States Pharmacy law? (4) Give the reasons for advocating the payment of all expenses of enforcing pharmacy laws by the State? (5) Why should all receipts be turned into the State treasury and all expenses be paid by the State? (6) Why should every registered pharmacist be compelled to have a diploma from a recognized college before taking his examination?

*H*—Criticism and translate the following. Write out with English names the ingredients and quantities. State how you would compound them, or what course you would pursue.

	37421	
R	Acidi Carbolici	gtt. xx
	Sodii Bicarb.	
	Sodii Borat.	āā ʒj
	Glycerini	f ʒj
	Aquæ ad.	f ʒiv
	4281	
R	Potas. Iod.	gr. iij
	Quin. Sulph.	gr. j
	Syr. Aurant.	ʒ ss
	Aquam ad.	ʒ iij
M.		
	73842, S. 99.	
R	Acid. Carbolici	ʒ iss
	Liq. Plumb. S. Acet.	f ʒ iij
	Aquæ q. s. ft.	f ʒ x
	Ft. Lotio Sec. Art.	
Sig.	Use externally.	

*J*—Criticism and translate the following. Write out with English names the ingredients and quantities. State how you would compound them, or what course you would pursue. Give the meaning of the numbers and marks on the margin :

R	Sarah McM.	
	M. S.	gr. j
	Am. Mur.	5j
	Mst. Fusc.	f 5iv
M. Sig.—	5 ij in aq. ev. h.	
	682.	
R	Dg.	
	Pulv. Rad. Bellad.	gr. 1/20
	Flor. Benzoes	
11321	Tannin Pur. āā	gr. j
	Sacch. Alb. F. P.	
	M. F. Pulv. D. T. D.	Dir. No. XX.
Sig.—	Evry mng & eng 1 powder to be given.	
	N. K.	
R	B. A. 20509.	
	Ol. Copaib.	℥ij
	Magnesia	gr. ij
	Pulv. Acacia	gr. j
	M. ft. pil mitte tales	xxxvj
	B. J.	

*K*—Fill up six of the labels upon the sheet attached, writing suitable directions for the prescriptions found on Questions H and J.

Then write three complete prescriptions upon the blanks printed on the sheet: (1) For a baby six months old, suffering from indigestion and diarrhea (four powders containing magnesia in a proper dose). (2) One for an old lady requiring a tonic and nerve stimulant, containing Tincture of Nux Vomica, Diluted Nitrohydrochloric Acid and Elixir of Orange (teaspoonful dose, 8-ounce mixture). (3) One metric prescription for a man thirty years old, requiring a suppository containing Extract of Belladonna and Powdered Opium (12 suppositories).

Write labels for the prescriptions above, and also for the following: (4) One for an ointment to apply for a slight eruption on the face, hands and arms, due to sunburn. (5) One for 12 pills for an adult suffering from constipation.

Upon labels for Nos. 4 and 5 write the name and the kind of pills and ointment, and brief directions for use.

#### CHEMISTRY.

*A*—(1) Describe Acidum Stearicum and Acidum Oleicum. (2) Give the formulas of the alcohols and the hydrocarbons from which Stearic Acid and Oleic Acid respectively are derived. (3) To what series do they belong respectively? (4) What important reaction with fatty oils is dependent upon this distinction? (5) What are the pharmaceutical and technical uses of these two acids?

*B*—(1) Describe the pure Cellulose of the U.S.P., and give its official name. (2) What solvent for Cellulose is known? (3) What is the action of strong Sulphuric Acid upon Cellulose? What of dilute Sulphuric Acid? What of strong Nitric Acid? (4) What pharmaceutical products are obtained as the result of these several actions? (5) What important industrial applications for the same products?

*C*—(1) Write the structural formula for Acetanilidum, and state to what class it belongs. (2) Mention any other synthetic compounds of importance belonging to this class. (3) Show by formulas the difference between diphenylamine and phenylene-diamine. (4) What color tests in water analysis depend upon the use of these compounds? (5) Give the reactions for the formation of a di-azo compound and the production of a phenol from the same.

*D*—(1) Give the official name for phenol, and state its source and properties. (2) What are the pharmacopœial tests for phenol? (3) What compound is formed by the action of strong Nitric Acid upon phenol, and what is the character of the compound thus formed? (4) Name the two isomeric compounds  $C_6H_4(CH_3)OH$  and  $C_6H_5CH_2OH$  and state how you would establish the identity of each. (5) Name the isomeric compounds  $C_6H_4(CH_3)Cl$  and  $C_6H_5CH_2Cl$  and state by what reaction you can distinguish between them.

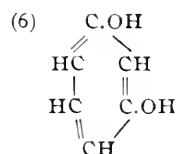
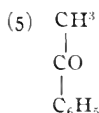
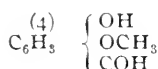
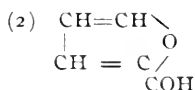
*E*—(1) What is the exact chemical name and structural formula of Salicylic Acid? (2) What are its natural sources? (3) Write the reactions for its synthetic formation. (4) Name the official salts and esters of Salicylic Acid. (5) Give the pharmacopœial tests for Salicylic Acid.

*F*—(1) What is the chemical distinction between an alkaloid and a glucoside? (2) By what chemical tests do you establish this difference? (3) What are some of the most important alkaloidal reagents? (4) What compounds are indicated as the underlying substances in the alkaloidal formulas? (5) By what reaction have glucosides been made artificially?

*G*—(1) Define a terpene and give a typical example, with an account of its properties. (2) What classes of compounds accompany the terpenes in their occurrence in nature? (3) Give examples of official essential oils that do not contain terpenes. (4) Into what several groups may resins be divided? Give the distinguishing characters of each.

*H*—Write the graphic formulas of: (1) Tartar Emetic. (2) Phenacetine. (3) Ortho-oxybenzoic Acid. (4) Benzaldehyde. (5) Gallic Acid. (6) B-Naphthol.

*I*—Give proper chemical names for:



*K*—Examples in Proximate Organic Analysis.



(1) How would you identify and determine the components in a mixture of free fatty acid, fatty oil, and mineral oil? (2) How would you identify and determine the components in a mixture of aromatic hydrocarbon, phenol and ketone?

#### MATERIA MEDICA.

*A—Medical Terms, etc.*—Define briefly the following terms, viz.: (1) Epispastic. (2) Antiseptic. (3) Escharotic. (4) Hypnotic. (5) Disinfectant. (6) Lithontriptic. (7) Ecbolic. (8) Errhine. (9) Cholagogue. (10) Sudorific. Give three illustrations of each of the above terms from the following list, viz.: Sulphonal, Podophyllin, Dover's Powder, Ergot, Mustard, Caustic Potassa, Corrosive Sublimate, Iodoform, Potassium Citrate, Pilocarpine, Nitric Acid, Formaldehyde, Savine, Veratrine, Trional, Aloin, Boric Acid, Lithium Citrate, Euonymin, Piperazin, Chloral, Carbolic Acid, Bloodroot, Mezereum, Hot Bath, Thymol, Cantharides, Arsenic, Cotton Root Bark, Ginger.

*B—Official Names, etc.*—Give the official names of the following and state what constitutes in each case the official drug: (1) Wolfsbane. (2) Woody Nightshade. (3) Mediterranean Onion. (4) Henbane. (5) Wormwood. (6) Indian Hemp. (7) Canadian Hemp. (8) Stinkasant. (9) Culver's Physic. (10) Blue Cohosh. (11) Succus Thebaicum. (12) Soldier's Friend. (13) Lactose. (14) Queen's Root. (15) Cutch. (16) Cleum Jecoris Aselli. (17) Indian Tobacco. (18) Osgall. (19) Bitter Apple. (20) Spotted Hemlock.

*C—Anti-Constipation Pills.*—Write out a formula for twelve pills which shall contain the proper amounts of the following ingredients, viz.: Aloin, Extract of Nux Vomica, Extract of Belladonna, Extract of Physostigma. How should they be given?

*D—Official Names, Natural Orders, etc.*—Give the official names, natural orders and habitat of the drugs derived from the following origins, viz.: (1) Barosma crenulata. (2) Rhamus Purshiana. (3) Nicotiana Tabacum. (4) Cannabis Sativa. (5) Fraxinus ornus. (6) Croton Tigilium. (7) Ecballium Elaterinum. (8) Veronica virginica. (9) Pinus palustris. (10) Abies balsamea. (11) Brassica alba. (12) Melaleuca Leucadendron. (13) Citrus Bergamia. (14) Garcinia Hanburii. (15) Liquidamber orientalis. (16) Ruta graveolens. (17) Swertia Chirata. (18) Dryopteris Filix-mas. (19) Astragalus gummifera. (20) Claviceps purpurea.

*E—N. O. Solanaceæ.*—(1) Give the official names and active constituents of four leaf drugs, a fruit drug and a stem drug derived from plants belonging to this order. (2) Give the dose of four official alkaloidal salts derived from the above sources. (3) What is the action of the latter upon the pupil of the eye, and what are the drugs which act in this way called? (4) Name two official drugs that have an opposite action, and the class of drugs to which they belong.

*F—Monkshood.*—(1) State three prominent ways in which you would differentiate this drug from dandelion root. (2) State its alkaloidal constituents, and the acid with which they are combined. (3) What is the action of this drug upon the cutaneous sensory nerves, the heart and the respiration? (4) State the medicinal properties of this drug, and the method of giving it to get the best results. (5) How would you treat a case of poisoning by this drug?

*G—Volatile Oils.*—Give the Latin official names of the following, and the botanical names of the plants from which they are derived: (1) Oil of Flea-

bane. (2) Oil of Turpentine. (3) Oil of Cassia. (4) Oil of American Wormseed. (5) Oil of Allspice. (6) Oil of Cade. (7) Oil of Sweet Birch. (8) Oil of Wintergreen. (9) Oil of Pennyroyal. (10) Oil of Neroli. How should volatile oils be preserved, and what is the color of a medicinally active Oil of Fleabane?

*H—Vegetable Purgatives.*—(1) Give official names and doses of three laxative drugs. (2) Of three simple purgatives. (3) Of three drastic purgatives. (4) Of three cholagogue purgatives.

*I—Copaiba.*—(1) State the manner of its production. (2) How do the Para, the Rio Janeiro and the Maracaibo varieties differ from each other? (3) What is the best variety for making Massa Copaiba, and how should the others be treated to adapt them for this purpose? (4) What is the dose and action of this drug upon the mucous membrane of the bronchi and genito-urinary tract?

*K—Emergency Case.*—If a case were brought to your store exhibiting the following symptoms, viz: Complete unconsciousness, from which the patient cannot be roused, face flushed, eyes congested, pupils unequally dilated and uninfluenced by light, breathing stertorous, pulse slow but nearly normal, and perhaps paralysis of motion and sensibility of one side, what would be your diagnosis and treatment?

#### COMMITTEE.

*A—Bismuth.*—(1) Give the unabbreviated official name, specific gravity and symbol. (2) Describe its physical properties. (3) In what form is Bismuth generally found in nature? (4) What process is used for purifying Bismuth? (5) Name the official salts of Bismuth. (6) What impurity are these salts liable to contain? (7) What is the pharmacopœial test for this impurity? (8) Give the important tests for the identification of Bismuth in solutions. (9) What important properties does Bismuth communicate to its alloys? (10) What are the medical uses of Bismuth?

*B.*—(1) What is the difference between a granulated salt and one which is powdered? (2) Explain the cause of the formation of lumps during the process of granulation. (3) State how they may be avoided without resorting to trituration. (4) How are granulated Effervescent Salts made? (5) What advantages are gained by the administration of remedies in this form? (6) Give an outline of the formulas of two official granulated Effervescent Salts. (7) Name one or more common household chemicals which are usually seen in the granular form.

*C—Cinchona Bark.*—(1) Give the names of two official barks and their botanical origins. (2) What countries yield the principal supply of these barks? (3) What is meant by the terms "natural," "mossed" and "renewed" bark? (4) What is Grahe's test for Cinchona Bark? (5) What are the U.S.P. requirements for alkaloidal strength for the official barks? (6) What action does quinine have upon micro-organisms? (7) State the dose of quinine when given as a tonic, an antiperiodic, or as a prophylactic. (8) What are the disadvantages of quinine pills that are insoluble in the stomach?

*D.*—Give the English name or synonym, ingredients, brief outline of process, and describe the appearance of *Liq. Ferri et Ammonii Acetatis*, *Pilulæ Rhei Compositæ*, *Syrupus Ipecacuanhæ*, *Tinctura Gentianæ Compositæ*, *Vinum Antimonii* and *Spiritus Juniperi Compositus*.

*E*—(1) If 5 pounds of Sodium Bicarbonate were accidentally emptied into a drawer which you knew contained just 9 pounds of Rochelle Salt, what would you do to remedy the mistake, and utilize the mixture? Give name of substance and quantity used to make it available. (2) How many c.c. would a mixture of the following liquids measure: 2,000 grammes each of water, alcohol and glycerin of official strength? (No allowance for contraction or temperature.)

*F*—*Volumetric Analysis*.—(1) What is a normal solution? (2) Illustrate by giving the molecular weights and grams used per liter of the following: Sulphuric Acid, Sodium Hydrate, Silver Nitrate, Iodine, Potassium Permanganate. (3) What are the advantages of volumetric solutions of lesser strength? (4) What are the disadvantages of most of the volumetric solutions of the U.S.P.? (5) Name the official volumetric solutions with which all other volumetric solutions can be standardized. (6) What is an indicator? (7) Name five of the more important indicators and name the chemicals or class of chemicals for which each is used.

*G*—*Ipecac*.—(1) Give the origin, habitat and constituents of Ipecac. (2) In what respects do the Rio and Carthagena varieties differ? (3) Can one be substituted for the other? (4) Mention some of the drugs that have been suggested as substitutes for Ipecac.

*H*—*Doses and Antidotes*.—Give the maximum single dose of each of the following. Also name the antidotes and physiological antagonists of the first five of them: Tincture of Aconite, Tincture of Digitalis, Cocaine Hydrochlorate, Morphine Sulphate, Strychnine Sulphate, Diluted Hydrocyanic Acid, Codeine Sulphate, Tincture of Nux Vomica, Atropine Sulphate, Hyoscyamine Sulphate.

*I*—(1) How would you compound the following prescription? State the object for directing the Salol coating.

R Argenti Nitratis gr. x  
Pulv. Opii gr. vj

M. ft. pil. No. XII. Coat with Salol and place in capsules coated with Salol.

Sig.—One every 3 hours.

(2) Criticise this prescription. What difficulties are likely to occur, and what precautions would you take to avoid them?

R Liq. Ammon. Acetat. f̄ ̄ iv  
Acid. Acetic f̄ ̄ j  
Tinct. Ferri Chloridi f̄ ̄ ss  
Glycerini f̄ ̄ ss  
Mucilago Acaciz q. s. ft. f̄ ̄ viij

Misce. Sig.—One teaspoonful every 2 hours.

*K*.—(1) Write a prescription for thirty pills, using unabbreviated official names and expressing the quantities metrically, each pill to contain

R Arsenous Acid gr. i 20  
Aloin gr. i 6  
Vallet's Mass gr. iss  
Cinchonidine Sulphate gr. ij  
M. Sig.—One pill ter in die.

Translate the directions and name the best excipient.

(2) State exactly how you would prepare the following prescription. Would you dispense it as written? Give reasons for your mode of procedure.

R Acidi Arsenosi . . . . . '5  
Potassii Bicarb. . . . . 1'  
Aq. Destillat. . . . . 100'  
Ft. solutio sec. art.  
Sig.—Let 4 c.c. be given every 2 hours.

#### OPERATIVE PHARMACY.

##### (1) POWDERS.

R Hydrarg. Chlor. Mit. . . . . 0·1 Gramme  
Pulv. Rhei . . . . . 0·3 "  
Testæ Prep. . . . . 1' "  
M. ft. Chart. No. XII.

##### (2) GRANULAR EFFERVESCENT SALT.

Sodium Phosphate . . . . . 12·5 Grammes  
Citric Acid . . . . . 4·5 "  
Tartaric Acid . . . . . 6·75 "  
Sodium Bicarbonate . . . . . 12·5 "

##### (3) OINTMENT.

Mercury . . . . . 2·5 Grammes  
Nitric Acid . . . . . 3' C.c.  
Nitric Acid . . . . . 2. "  
Lard Oil . . . . . 30' "

##### (4) EMULSION.

Make 100 c.c. of an emulsion, by the English method, which must contain 50 per cent. of Cod Liver Oil. Put it in a bottle and write on the label the quantities of each ingredient used.

##### (5) SUPPOSITORIES.

Extract of Stramonium . . . . . '50 Gramme  
Tannic Acid . . . . . '50 "  
Oil of Theobroma . . . . . 6' Grammes  
Make six suppositories by rolling.

#### ANALYTICAL CHEMISTRY.

(1) Describe the gravimetric and volumetric estimations of iron in Ferrous Sulphate. What are the advantages of the latter method?

(2) (a) Give the formula of the precipitate obtained in the quantitative determination of aluminum and state the change occurring during ignition.  
(b) How much "Alumen" will be equivalent to 0·153 of this ignited substance?

(3) (a) Why is it necessary, in the gasometric estimation of Hydrogen Dioxide, to make a correction for temperature before calculating percentage?  
(b) If a sample of Hydrogen Dioxide yields 11 volumes of oxygen at 20° C., what is its percentage strength?

(4) State the quantities of pure chemicals present in 200 c.c. of  $\frac{2}{N}$  Hydrochloric Acid, of  $\frac{N}{10}$  Barium Hydrate, of  $\frac{N}{2}$  Ammonia.

(5) Name the volumetric solutions and indicators (stating the end-reaction in each case) used in titrating Ferric Chloride, Arsenous Oxide, and Phenol.

(6) (a) Calculate the factor of a silver nitrate v.s. 10 c.c. of which react with 8 c.c.  $\frac{N}{10}$  Sodium Chloride v.s. (b) How much potassium Iodide will be equivalent to 1 c.c. of this silver nitrate v.s.?

(7) How would you standardize a Sulphuric Acid v.s.?

(8, 9 and 10) Volumetric estimations of Ferric Chloride, Arsenous Oxide, Phenol.

#### COMMERCIAL TRAINING.

*A—Ordering Goods.*—Write out an order for the following goods on Smith, Brown & Co., Wholesale Druggists, Boston, Mass. You are not known to them, but you have good credit. Be careful to use proper forms, abbreviations and details. Select any ten articles that you would be apt to need, each representing a different class of goods—say, 1 chemical, 1 drug, 1 fluid extract, 1 kind of soap, 1 kind of toothbrush, etc. Write the order in such form that the drug house would not be in doubt on any single point. Fold the order properly and place it in an envelope properly addressed.

*B—Writing a Business Letter.*—Write a model letter, asking for a position (containing about 100 words), to either a retail druggist, wholesale house, or manufacturer having a vacancy, giving such information about yourself as would be useful, and impressing the firm with the desirability of securing your services. Fold the letter properly and place it in an envelope properly addressed.

*C—Bank Checks.*—(1) Describe the formalities necessary in opening an account with a bank. (2) Under what circumstances does a bank require identification? (3) Why is identification necessary? (4) What are the titles of the usual officers and principal employees of a bank, and state very briefly their chief duties. (5) Why is a check sometimes drawn "to order" and sometimes "to bearer"? (6) Which manner of drawing is usually preferable, and why? (7) When you have received a check, drawn to your order, with your name misspelled, what course is to be pursued? (8) Draw a check upon the College of Pharmacy Bank for \$80.75, upon the paper before you, omitting no necessary detail. (9) What is a "certified check"? (10) What is a "clearing house"?

*D—Insurance.*—(1) Define the business term "insurance." (2) Name four kinds of insurance in common use. (3) Define the terms "policy," "premium," "good risk," "hazardous." (4) What value has insurance in affecting the credit of an individual or firm? (5) What is meant by the contradictory term of a firm "insuring itself"? (6) Has life insurance value in establishing the credit of a business man? (7) What is the principal advantage of life insurance?

*E—Transportation.*—(1) When goods (small or large packages) are to be, sent to a distance, describe briefly but accurately, with proper business forms

how each kind may be transported. (2) How may money be sent with comparative safety to a distant point? (3) Name all of the methods that you know of, giving reasons for preferring one over the other under varying circumstances.

*F—Commercial Terms.*—Define the following terms: (1) Executor. (2) Administrator. (3) Power of Attorney. (4) Mercantile Agency. (5) F.O.B. (6) Will. (7) Mortgage. (8) Deed. (9) Lease. (10) Bill of Lading.

*G—Card Indexes.*—(1) Describe a card index for recording petty cash sales. (2) Name advantages and uses of the card index system for general purposes.

*H—Promissory Notes.*—(1) What is a promissory note? (2) Describe briefly their uses in business. (3) What is an accommodation note? (4) What risk is incurred through endorsing promissory notes? What is meant by a note "going to protest"?

*I—Book-keeping.*—(1) Define a book of original entry. (2) Day-Book. (3) Journal. (4) Cash-Book. (5) Ledger. (6) Posting. (7) Trial Balance.

*K—Book-keeping.*—(1) What two forms of book-keeping are practised? (2) Describe briefly the principle of each.

#### SPECIMENS.

The following specimens were placed before the members of the Class for recognition:

(1) *Pharmacy.*—Adeps Lanæ Hydrosus, Ceratum Resinæ, Elixir Aromaticum, Pulvis Ipecacuanhæ et Opii, Aqua Chloroformi, Syrupus Rosæ, Vinum Ferri Citratis, Tinctura Myrrhæ, Extractum Ergotæ Fluidum, Liquor Iodi Compositus.

(2) *Chemistry.*—Benzinum, Amylum, Sodii Salicylas, Acidum Tartaricum, Plumbi Oxidum, Acetanilidum, Potassii Ferrocyanidum, Acidum Tannicum, Glycerinum, Plumbi Acetas.

(3) *Materia Medica.*—Gentiana, Senega, Cimicifuga, Podophyllum, Frangula, Xanthoxylum, Matico, Digitalis, Chenopodium, Sinapis Nigra.

(4) *Committee.*—Tinctura Gentianæ Composita, Tinctura Benzoini Composita, Syrupus Ferri Iodidi, Magnesii Carbonas, Acidum Boricum, Potassi Bicarbonas, Stramonii Semen, Belladonnæ Folia, Aconitum, Sanguinaria.

#### ANNUAL MEETING.

The Annual Meeting of the Philadelphia College of Pharmacy was held on March 31st, at the College Building, 145 North Tenth Street.

Twenty-seven members were present, the President, Howard B. French, presiding.

The minutes of the quarterly meeting held December 30, 1901, were read and approved.

The minutes of the meetings of the Board of Trustees for December 3, 1901, January 7 and February 4, 1902, were read by the Registrar, W. Nelson Stem, and approved.

The annual meeting being the occasion for the reports of the officers and Standing Committees, these were given in the following order:

President's Report: The property at the present time is in fairly good condition. All necessary repairs have been made as economically as possible, yet it seems essential to have many things done to bring them up to that standard that is desirable for the institution to maintain.

The Faculty have worked most harmoniously for the best interests of the institution, and never within the knowledge of the President has more zealous and faithful work been done by the teaching force.

For the term 1901-02 there has been an increase of twenty-three students over the preceding year.

The Course in Commercial Training, which, while compulsory, is without cost to the students, has been attended by about 175 members of the Second- and Third-Year Classes.

There has been an increase in the number of special students in the Microscopical Laboratory, and quite a number have taken individual instruction in the Pharmaceutical Laboratory, in prescription compounding, and special work on theses.

In this connection commendation is made to the Assistant Director of the Pharmaceutical Laboratory, E. F. Cook, for suggesting and starting prescription compounding.

Since the last annual meeting seventeen new members have been elected and two members have resigned.

"In educational matters the institution has retained its leading position in the pharmaceutical world, yet your President would suggest the desirability of considering the advantage of establishing a Post-Graduate Course. The course of illustrated lectures delivered during the past winter was so largely attended and they were of such special value to the College that it would seem advisable for the Board of Trustees to arrange for a similar course next year. In conclusion the President expresses his appreciation of the active co-operation of his fellow-officers and others in authority."

Committee on Publication, by Samuel P. Sadtler. THE AMERICAN JOURNAL OF PHARMACY has been issued regularly during the past year, and while the cost of printing and paper has advanced nearly 20 per cent. it has been possible to reduce the expenses along certain lines (as referred to in a previous report), so that the general running expenses have not been increased. The number of unsold volumes on hand is estimated at about 1,675, covering the period from 1829 to the present time. Some of the volumes are becoming extremely rare, and are becoming more valuable on this account.

Editor's Report, by Henry Kraemer. THE AMERICAN JOURNAL OF PHARMACY continues to embody to a greater or less extent the history of American Pharmacy as it has done since 1825; and during the past year papers of historical, professional and practical value have been secured.

Librarian's Report, by Thomas S. Wiegand. The library has been consulted much more during the past year than for a considerable time, both by the Classes and others; 301 bound volumes and 834 unbound volumes and pamphlets have been presented by the President.

Seventy-eight bound volumes and 76 pamphlets and unbound volumes have been received, and over 80 volumes of exchanges have been bound and added to the library.

Report of Committee on Pharmaceutical Meetings, by Richard V. Mattison, M.D. The meetings have been held regularly during the College year. The programs have been of both professional and practical interest. The attendance has been increased, and more interest manifested by retail pharmacists than heretofore, at least for some years back.

Curator's Report, by Joseph W. England. The Museum is in good condition and has received a number of additions during the year. The working collection of official drugs and preparations continues to be of undiminished interest and practical worth to the students in their daily work. A previous suggestion that the preparations of the National Formulary should be placed in the reading-room is renewed.

The resignation of Mr. L. S. A. Stedem was presented, and on motion accepted, when all the requirements had been complied with.

The various recommendations contained in the reports of the President, Committee on Pharmaceutical Meetings and Curator were then taken up, and on motion they were referred to the Board of Trustees. The following names of nominees for honorary membership made at the December meeting were then balloted for and unanimously elected: Prof. Chas. F. Chandler, Columbia University; Dr. Albert B. Prescott, University of Michigan; Dr. Fred B. Power, Scientific Laboratory of Burroughs, Wellcome & Co., London, Eng.

Delegates to the meeting of the Pennsylvania Pharmaceutical Association, at Buena Vista, June 24th-27th, were appointed: C. A. Weidemann, H. L. Stiles, Meiers Busch, Joseph W. England and Jacob M. Baer.

The annual election being next in order, Mr. William McIntyre and Mr. Jacob M. Baer were appointed tellers, who, after a ballot, reported the election of Howard B. French, President; William J. Jenks, First Vice-President; Richard V. Mattison, M.D., Second Vice-President; James T. Shinn, Treasurer; A. W. Miller, M.D., Corresponding Secretary; C. A. Weidemann, M.D., Recording Secretary; Joseph W. England, Curator; Thomas S. Wiegand, Librarian; Henry Kraemer, Editor.

Trustees for three years: Joseph P. Remington, T. Morris Perot and C. Carroll Meyer.

Publication Committee: Henry N. Rittenhouse, Samuel P. Sadtler, Wallace Procter, Henry Kraemer, Joseph W. England, Joseph P. Remington and R. V. Mattison, M.D.

Committee on Pharmaceutical Meetings: R. V. Mattison, M.D., Joseph P. Remington, Henry Kraemer, C. B. Lowe, M.D. and William L. Cliffe.

A recess was declared while the vote was being counted. Professor Remington alluded to the coming meeting of the American Pharmaceutical Association, which would be held at the Hotel Walton, Philadelphia, September 8th-15th. He stated that an exhibition would be arranged at Horticultural Hall, and urged the active co-operation of all the members and druggists generally, as the meeting promised to be one of the most instructive and interesting ever held. Dr. C. B. Lowe also urged the members to get to work in earnest.

C. A. WEIDEMANN, M.D.

*Secretary*



# THE AMERICAN JOURNAL OF PHARMACY

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*JUNE, 1902.*

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## THE EVOLUTION OF THE UNITED STATES PHARMACOPŒIA.

BY M. I. WILBERT,

Apothecary at the German Hospital, Philadelphia.

With the eighth decennial revision of the United States Pharmacopœia in active preparation, it was thought that a review of some of the previous editions might prove to be of interest.

The history of the inception, origin, and continuation of the Pharmacopœia is sufficiently well told in the introductory pages of the last edition, so that we may confine these remarks exclusively to a review of the construction, arrangement, and contents of the various books.

To do this more readily and also more satisfactorily, we have computed and arranged a considerable amount of the information into tables, that, in a general way, show the contents and scope of the book at the different decennial periods.

The first edition of the Pharmacopœia is admittedly based on the "Pharmacopœia of the Massachusetts Medical Society," Boston, 1808. This work, while eight years older than "The Pharmacopœia of the New York Hospital," appears to have been much more popular, and to have enjoyed a larger circulation; consequently, had a greater following. Another reason why the "Massachusetts Pharmacopœia" was favored is found in the fact that the New England delegates to the "National Medical Convention" were sufficiently numerous and influential to practically dominate the convention. This is corroborated by the fact that the first edition of "The Phar-

macopœia of the United States," as the book was called even at that time, was printed in Boston.

This first edition had, however, several original features, in which it differed, not alone from the earlier American works, but also from any of the European Pharmacopœias that were in use in or consulted in different parts of the country.

The *Materia Medica*, or "Catalogue of Medicinal Substances not included in the Preparations," was divided into a primary and a secondary list. This was done so that a physician or an apothecary might tell at a glance whether or not a particular substance was much used or popular, or, as noted in one of the later editions, "it permitted a discrimination between medicines of acknowledged value and others of less estimation." The second point of difference was, that while other Pharmacopœias had either been printed in the vernacular or entirely in Latin, the body of this book was primarily in Latin, but had, on the opposite pages, a free translation of the Latin into English.

This was evidently done for several reasons: in the first place, the vernacular was introduced to make the book accessible to a number of physicians and pharmacists who were not familiar with the Latin, while the Latin was used to make the book more popular in those sections of the country where the English language was not so well understood, and also, "To make the meaning of the various directions more clear, in case the English might be considered ambiguous."

As noted above, this first volume was printed in Boston, and consisted of 272 octavo pages. If we subtract from this 101 pages of duplicated material, we would have a book of 171 pages. These pages, as is shown in the following tables, contained a total of 621 titles. Of these, 221 were in the primary and 71 in the secondary list of the *Materia Medica*. These two lists are described in the introduction as being "A Catalogue of Simple Medicines, together with some prepared medicines which are kept in the shop of the apothecary, but not necessarily prepared by him." Among these simple medicines we find antimonum, argentum, aurum, cuprum and plumbum; these were raw materials from which corresponding chemical compounds were to be made by the apothecary. Organic drugs, in use at the present time, were well represented in this first edition; among them we may note such familiar substances as

acacia, asafetida, benzoin, camphor, kino, lobelia, myrrh, opium and squill. Some of the English and also Latin titles are a little unfamiliar at the present time; we find, for instance, *nux vomica* referred to as "vomic nut," while ergot is found in the secondary list with the English title "spurred rye," sometimes called "ergot."

The portion of the book entitled Preparations includes 329 titles. As will be seen by comparing the number of articles classed under preparations in Table 1 with those called galenicals in Table 2, many of these so-called preparations would not be classed with preparations at the present time. This section of preparations included formulas for making chemical substances like benzoic acid, citric acid, calomel, corrosive sublimate, sulphuric ether, tartar emetic, and oxide of zinc. There were also included a large number of essential or volatile oils, with directions for producing them in the laboratory of the apothecary.

TABLE NO. 1.—GIVING THE NUMBER OF TITLES IN THE FIRST SIX EDITIONS WITH THEIR CLASSIFICATIONS.

	1820	1830	1840	1850	1860	1870
Primary list . . . . .	221	220	241	253	304	330
Secondary list . . . . .	71	86	90	91	75	72
Preparations . . . . .	329	314	357	424	494	569
Total . . . . .	621	620	688	768	873	991

TABLE NO. 2.—GIVING THE COMPARATIVE NUMBER OF VEGETABLE, CHEMICAL AND ANIMAL DRUGS, ALSO THE NUMBER OF GALENICAL PREPARATIONS IN THE VARIOUS EDITIONS OF THE UNITED STATES PHARMACOPŒIA.

	1820	1830	1840	1850	1860	1870	1880	1890
Vegetable . . . . .	254	260	281	297	312	321	264	255
Chemical . . . . .	109	116	124	140	176	192	233	239
Animal . . . . .	12	15	17	19	18	18	15	18
Galenical . . . . .	246	229	266	312	367	440	481	473
General formulæ . . . . .							4	5
Total . . . . .	621	620	688	768	873	971	997	990

TABLE NO. 3.—GIVING THE COMPARATIVE NUMBER AND CLASSES OF PREPARATIONS.

	1820	1830	1840	1850	1860	1870	1880	1890
Abstracts . . . . .							11	
Cerates . . . . .	11	11	9	10	16	10	8	6
Collodions . . . . .				1	1	3	4	4
Confections . . . . .	6	7	5	5	5	5	2	2
Decoctions . . . . .	14	11	12	13	12	12	2	2
Elixirs . . . . .							1	2
Emulsions . . . . .								4
Extracts . . . . .	16	16	24	28	32	34	32	34
Fluid Extracts . . . . .				7	25	46	79	87
General Formulæ . . . . .							4	5
Glycerites . . . . .						5	2	6
Honeyes . . . . .	3	3	4	3	3	3	3	3
Infusions . . . . .	23	20	27	32	31	31	5	4
Juices . . . . .						2		
Liniments . . . . .	9	6	6	6	7	9	10	9
Mixtures . . . . .	9	5	5	6	8	8	11	4
Mucilages . . . . .		1	2	2	4	4	5	4
Ointments . . . . .	19	18	22	25	23	29	26	23
Oleates . . . . .							2	3
Oleoresins . . . . .					5	6	6	6
Papers (Chartæ) . . . . .						2	3	
Pill Masses . . . . .							3	3
Pills . . . . .	23	13	17	18	19	19	15	15
Plasters . . . . .	8	9	11	13	16	17	17	13
Powders . . . . .	7	3	4	4	7	7	9	9
Pulps . . . . .			3	3				
Resins . . . . .					3	3	4	4
Solutions . . . . .					21	26	26	24
Spirits . . . . .	7	11	10	10	15	16	22	25
Suppositories . . . . .						9		1
Syrups . . . . .	15	14	16	19	23	23	34	32
Tinctures . . . . .	51	47	56	59	56	58	73	72
Triturations . . . . .							2	1
Troches . . . . .	3	3	5	6	9	13	16	15
Vinegars . . . . .	2	3	4	4	6	5	4	2
Washes . . . . .	4							
Waters . . . . .	10	8	8	9	13	15	15	19
Wines . . . . .	10	9	10	10	9	9	14	10

The number and kind of galenical preparations are well illustrated in Table 3. This table also illustrates the progress or change that has been brought about in the various decennial revisions.

The general features of this first volume were retained through six editions. One interesting feature that has been developed is the fact that all of the various editions may be considered in pairs. We find, for instance, that the 1820 and 1830 Pharmacopœias have much in common, both as to contents as well as style and general appearance. Their publication was authorized directly by the "National Medical Convention," composed entirely of physicians. In 1840 the revision was delegated to a revision committee, and they in turn consulted the different Colleges of Pharmacy as to much of the detail; so that the pharmaceutical profession practically assisted in both the 1840 as well as in the 1850 editions, and these two books have also other points of similarity that we will call attention to later. In the 1860 revision of the Pharmacopœia the pharmaceutical profession practically dominated the revision committee, and the same may be said of the Pharmacopœia for 1870. The Convention for the revision of the Pharmacopœia in 1880 authorized extensive changes in the style and general make up of the book, and these changes were retained and elaborated in the 1890 edition.

A careful study of the accompanying tables will indicate many other points of similarity between the different pairs of books. For instance, the kind and number of articles enumerated in the first two editions are almost identical. There are, however, evidences of progress. For instance, under the heading "Materia Medica" we find what the Revision Committee in the preface call "accessory matter." This accessory matter was intended to give precision to the officinal terms, and consisted, in the case of chemical substances, of a short description, and in the case of botanic drugs, of a description of the part of the plant that was intended to be used, and the designation of its botanical origin by giving the full botanical name and its author, or a reference to a book where the description of the particular plant could be found.

In the second part the descriptions or definitions of the various classes of preparations were omitted in this second edition. The reason given for this in the introduction was that "They are out of place in a Pharmacopœia which is intended for the guidance of

those already instructed in medicine and pharmacy." Among other innovations in this second volume we find iodine in the primary list, and a formula for making iodide of potassium given in the list of preparations. In this same book we also find formulas for making morphine and quinine and several of the salts of these alkaloids. Among the other interesting additions was the introduction of a colored compound spirit of lavender, and this in turn was used in the composition of the solution of potassium arsenite, thus instituting a practice that has been retained through all the various revisions to the present time.

With the 1840 edition we find a considerable change in the general appearance and also in the contents of the book. The most evident changes are, of course, the omission of the Latin portion of the work, the introduction of optional processes for using displacement filtration, or percolation, in the making of tinctures or other liquid preparations of vegetable drugs, and the introduction of better and fuller directions for making the various kinds of preparations. The improvement in this section of the book was, of course, directly due to the fact that the "National Medical Convention" had recognized the shortcomings of the previous editions, and had authorized the committee, to whom the revision of the *Pharmacopœia* had been delegated, to request the co-operation of the Colleges of Pharmacy in the United States. By virtue of this authority, the chairman of the committee had addressed letters to the presidents of the Colleges of Pharmacy of Boston, New York and Philadelphia, requesting their co-operation in the revision of the work. In answer to these letters the Colleges of Pharmacy of Boston and New York sent communications, proposing important changes. These changes were evidently acted upon, and the draft of the proposed new *Pharmacopœia* was then turned over to a committee that had been appointed by the "Philadelphia College of Pharmacy" to review it before it was turned over to the printer. The review of this P.C.P. Committee was evidently so thorough and exhaustive that it necessitated a complete re-writing of the whole book at the hands of the Revision Committee. For, as explained by this committee in apologizing for the unavoidable delay in publishing the new book, "The proposed alterations were too numerous to admit of being incorporated with the existing *Pharmacopœia*."

To mention a few of the new features of this edition we might

say that articles of a chemical nature had appended to them descriptions of their physical and chemical properties, with a view of facilitating their recognition, or the recognition of probable contaminations. The subject of displacement was, as noted before, introduced, and many of the formulas have two distinct processes, giving the apothecary the choice of using either the new or the old and more familiar process of maceration and subsequent filtration. This double or alternative process was probably necessary, on account of the opposition that had been encountered to the introduction of this innovation. In the call for delegates to the convention for 1850, the Colleges of Pharmacy were requested to send delegates on equal terms with Colleges of Medicine. As a result of this innovation we find that pharmacists were well represented on the revision committee that was appointed in that year. The book itself followed rather closely along the lines that had been adopted by the committee of the preceding edition. There was, however, a marked increase in the number of preparations, and quite an improvement in some of the formulas. The subject of "displacement filtration" or percolation had evidently been carefully studied and elaborated. In this edition we also find, for the first time, quite a representation of what is now a most familiar class of galenical preparations, the fluid extracts.

In 1860 another innovation was introduced. The Pharmacopœial Revision Committee, appointed by the "National Convention for revising the Pharmacopœia," recognizing that former editions had not met with the sale and use that a work of this kind should have, determined to make an effort to introduce the Pharmacopœia to a wider range of usefulness. With this object in view, and despite the fact that progress in medicine and pharmacy had necessitated the introduction of a large number of new drugs and preparations, the size of the book was materially reduced. This was accomplished by the use of smaller type and a more accurate and scientific classification of the preparations. For instance, the class of solutions was, for the first time, gathered together under one heading. The same may be said of several other preparations that in previous editions had been placed under several headings; in this edition they were all gathered together under their proper classification.

Mr. William Procter, Jr., it appears, was the guiding genius in

this attempt at popularizing the Pharmacopœia. Among other things he induced the publishers to materially reduce their expected profits, and this, with the reduction in the size of the book, enabled the publishers to offer it for sale at the remarkably low price of one dollar a copy. While actual figures are not obtainable, there can be no doubt that this and the one immediately succeeding were the two most popular and most widely used of any of the editions of the United States Pharmacopœias.

The edition of 1870 retained many of the features of the fourth decennial revision, and despite the fact that the price was materially increased it still remained a popular book. This popularity is evidenced by the fact that for years after it had gone out of date it was still on sale through the usual channels, and even to-day it may be found on the shelves of many pharmacies among the books that are consulted and used in the everyday work of the dispensing counter or laboratory.

The revolution that was wrought in the make-up of the Pharmacopœia by the Revision Committee for 1880 is of comparatively modern date. This was really the first book that made any pretensions to be in line with advanced work and ideas. The old classification into a primary and secondary list of *materia medica*, and a separate list for preparations, was abandoned, and in its place we find an alphabetical arrangement of all drugs and preparations. While many of the old and practically useless drugs had been dropped, there still remained a goodly number of little used or obsolete drugs. Many of you will remember how the majority of the reviewers of the day, following in the footsteps of the late and much lamented Dr. E. R. Squibb, called attention to the unpopularity of the first or opening title in the book, *Absinthium*. This book, however, had many excellent features, and we can here call attention to but a few of them.

The descriptions of the crude drugs were elaborated so as to include structural peculiarities that could be made out with a pocket lens having a magnifying power of ten diameters. All of the chemicals had tests for their identity or purity added, and many of them had added volumetric estimations of allowable impurities. In addition to this, reliable assay processes were given for at least two of the alkaloidal drugs.

The exclusive use of the apothecaries' system of weights and



measures was abolished, and instead, by way of a compromise, the formulas were given in parts by weight, with the notable exception of those where definite quantities were called for, and here the metric weights were given with, and as an alternative for, troy or apothecaries' weights. This book then marked the definite introduction of the metric system of weights and measures into the practice of pharmacy in the United States. Altogether it was a creditable and highly scientific production, and one that will prove to be a landmark in the advance of pharmacy.

The unfortunate feature of this edition was the price at which the book was to be sold. That this was a mistake, and one that was recognized and not sanctioned by a large number of the members of the Revision Committee, is evidenced by the tone of an editorial in the AMERICAN JOURNAL OF PHARMACY (1882, p. 636). In this editorial the writer called attention to the high-handed action of the sub-committee on publication, and disclaimed any sympathy with the impending contract for publishing the Pharmacopœia.

The direct result of this peculiar action, of course, was that the book was not popular with the great majority of pharmacists. It found its way into the shops of but a comparatively few of the more advanced and more progressive members of the profession. Probably the most interesting feature in this connection is the fact that the individuals and interests against whom the blow was directed really benefited very materially by the change. This is, however, a subject that is hardly in keeping with the intentions of this particular paper; suffice it to say, therefore, that as a working manual the Pharmacopœia was largely displaced by one or the other of the various commentaries or works of that kind.

The 1890 edition, while following the lines that had been mapped out by the previous Revision Committee, included some radical changes. Among these was the abolition of the parts by weight, and the complete adoption of the metric system of weights and measures. In addition to this, many of the obsolete or useless drugs and preparations were discarded, and a higher standard of purity was required for those retained. These requirements, in many cases, have been considered too high, and it is true that in some instances a theoretical degree of purity was demanded that was difficult if not impracticable to obtain in practice.

This last edition of the Pharmacopœia, while not as popular as it

should have been, has nevertheless reached a much greater number of active pharmacists than the previous edition. All of this despite the fact that the 1880 edition directed the attention of the majority of these pharmacists to the evident advantages of the dispensaries and commentaries that were and are allowed to publish at will complete or modified working formulas for the different preparations. It must therefore be considered a promising indication for the future that a gradually increasing number of pharmacists are again making their preparations from, and comparing their crude drugs and chemicals to, the clear and graphic formulas and descriptions as given in the *Pharmacopœia* itself.

It will readily be admitted that the book from which the everyday work of the pharmacist is conducted should not be overburdened with foreign matter. The formulas should be clear and distinct and not given in duplicate or triplicate, as is the case with some as given in the dispensaries.

This brief review of the past editions will of course suggest speculation as to the merits and contents of the coming.

That the coming book will be a marked step in advance, and practically inaugurate a new era in professional pharmacy, is to be expected. That we have a right to expect this is evidenced, not alone by the indications from the past, but is already assured by the action and recommendations of the last convention. As is well known, this convention has authorized certain changes that will give the book a firmer and more authoritative position with the rank and file of both the medical and the pharmaceutical professions.

That the coming book will prove to be the equal if not superior of any of the recent editions of several of the European *Pharmacopœias*, is assured by the scientific character and attainments of the various members of the *Pharmacopœial* Revision Committee. That the new book will have exceptional merits is doubly assured by the established standards that it must at least equal, if not excel.

Whether or not it will become a popular book will depend largely on the action of the Committee on Publication, and mainly on the price at which it is to be sold. Let us hope that, for the sake of advancing the interests of scientific pharmacy in these United States, this committee may see its way clear to publish, not only a

scientific book, one that the present and also future generations of pharmacists may point to with pardonable pride, as depicting the sum total of our present knowledge, but, what is also to be desired, let us hope that the committee on publication sees its way clear to have the book issued in such shape that it will find its way into every shop where drugs and medicines are either sold or prepared. Let us hope that they will issue a book that will always lay open before the working pharmacist and be to him a guide and a reference in his daily work; a book that he will learn to cherish on account of the information that it contains; one that he will follow because its formulas are not alone simple and concise, but will, without unnecessary care, give preparations that compare favorably in appearance and efficiency with any that can be produced by the manufacturing pharmacists. In short, let us hope that the present Revision Committee can give us a book that is good enough and cheap enough to appeal to the physician as a source of information, to the student as a necessary text-book, and to the apothecary as a manual and guide in his everyday work.

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## THE U.S.P. DESCRIPTIONS OF CRUDE DRUGS

BY M. I. WILBERT.

Apothecary at the German Hospital, Philadelphia.

If we attempt to compare the crude drugs, of vegetable origin, as they are found in the pharmacies of to-day, with the descriptions of them as given in the last edition of the U.S.P., we will find that these descriptions do not describe the drugs as they are found in the ordinary channels of trade.

This discrepancy is of course due to the fact that, at the present time, many of these drugs are bought and sold as compressed herbs, or if the substances are to be used in the making of galenical preparations, they are usually bought in a comminuted, ground or powdered condition. This change in the physical characteristics of these various vegetable substances would appear to make it imperative that the coming Pharmacopœia include descriptions and tests by means of which these drugs, as they are actually found on the shelves of the retail pharmacist, may be readily recognized, and any probable adulterations or sophistications detected.

For this particular purpose the compound microscope offers a

means of establishing a series of tests that are easily applied, and are at least as reliable, or perhaps even more so, than a desultory examination of the macroscopic appearance of the whole drug.

To illustrate this point more fully, let us consider the descriptions and usual appearance of half a dozen of the more popular drugs as they occur in the trade.

Few pharmacists ever buy the seeds of *Strychnos Nux.vomica*, as they are described in the *Pharmacopœia*, and this for the simple reason that the drug miller, with steam-driven machinery, can comminute these tough horn-like bodies in a fraction of the time and at infinitely less cost than could the pharmacist with his historic but mechanically inefficient pestle and mortar. It is evident, therefore, that the only portion of the really excellent description of *nux vomica* given in the *Pharmacopœia* that is at all applicable to the drug, as usually bought by the pharmacist, is that "it is inodorous and persistently bitter." While it is true that under extract of *nux vomica* we have an assay process that is applicable to the drug itself, this process, however, does not give any method of differentiating strychnine from brucine or any other alkaloid that may be present. In this particular case it would appear desirable, then, that the *Pharmacopœia* include a definition of the color and microscopical appearance of this drug in the comminuted state, and also an enumeration of the kind of plant hairs and cells that may be recognized by means of the microscope. In addition to this it would appear desirable to introduce a test for definitely estimating the amount of strychnine present, and of differentiating this from any probable contaminating alkaloid.

*Cinchona* is another one of the drugs that are seldom bought in the whole or unground condition. This fact has already been recognized by the Revision Committee of the last *Pharmacopœia*, as under *cinchona* as well as under *cinchona rubra* we find a definition of the proper color of these drugs in their powdered form. We also find quite a reliable method of recognizing quinine and of estimating it apart from the estimation for total alkaloids.

For *cinchona*, then, it would only be necessary to add a description of the kinds of cells and cell contents that may be found, and possibly an enumeration of the kinds of cells that should not be present.

The chemistry of *ipecac* has been inquired into so thoroughly

during the past two or three years, that a method of assay for total alkaloids at least might be introduced. In addition to this a description of the color of the ground or powdered drug, with the chief cell characteristics, might be added.

Here it may be interesting to note some of the difficulties that will necessarily be encountered in developing satisfactory tests or descriptions for the various constituents and different appearances of powdered drugs. As is well known, the German Pharmacopœia, in its last revision, recognized the fact that many crude drugs are being marketed in a ground or powdered form, and has given quite a number of very satisfactory and reliable descriptions of the various powders. Among others it includes a description of the powder of ipecac. It appears, however, that the description strictly applies to the root of Brazilian origin; so that, despite the fact that chemical as well as physiological investigations have demonstrated that the Carthagena root is in many respects quite as efficient and even conforms with the chemical requirements of the German Pharmacopœia, it is nevertheless barred from use in Germany on account of the reputed difference in the size of its starch grains.

Apart from any question of whether or not it is necessary or desirable to admit the Carthagena ipecac on the same terms as the Brazilian root, this particular incident only illustrates the fact that we cannot possibly expect to have a series of descriptions that will prove to be perfect for an indefinite length of time, for, as has been repeatedly pointed out, it is only by making mistakes and subsequently discovering them that we can possibly expect to make progress in any vocation or science.

Belladonna leaves are certainly never seen in trade as herbarium specimens, so that at least the first half of the U.S.P. description would not be applicable to their identification, as they usually occur in the shops. In addition to the remaining portion of the description we should have an enumeration of characteristic cell formations that may be found and also a method of assay for the alkaloid.

Rhubarb belongs to a class of drugs for which we cannot, at the present time at least, expect to have a satisfactory chemical standard. We have, however, several qualitative tests, and also several distinct cell constituents and cell forms; these should be enumerated in the official description.

Practically the same is true of squill; here, again, a quantitative

chemical estimation is out of question, and only qualitative tests and the microscopical appearance of cells and the cell contents are available, by means of which we may recognize this drug or any of its possible adulterations.

These six drugs, picked at random from those contained in the Pharmacopœia, illustrate very well the needs and shortcomings of the present descriptions of vegetable drugs. What is true of these is true of almost every one of the organic drugs used or sold in the apothecaries' shop at the present time.

While the present Revision Committee has, no doubt, given considerable time and thought to a consideration of the needs and necessities of the coming edition of the Pharmacopœia, and has also considered the advisability of including descriptions of powdered drugs, its members will hardly be willing to make any radical innovations, however, unless they feel that these changes are needed and desired by a fair majority of the people for whom the Pharmacopœia is intended. Therefore, it remains for the individual pharmacist to recognize the importance and the necessity of his being able and willing to take advantage of any possible chance of improving the professional side of his calling, unless, of course, he is willing to degenerate more and more into being a vendor of somebody else's pharmaceutical specialties and other so-called patent medicines.

The Pharmacopœial Revision Committee will, no doubt, give us the kind of book we ask for. The members composing that committee are not alone eminently practical, but they are also scientifically able to give us a book that will compare favorably with any that has been published in Europe during the past five years, and it is quite safe to say that they are willing to incorporate the most desirable and practical information in the coming edition of the United States Pharmacopœia.

What should be done, however, is that the rank and file of the pharmaceutical profession recognize the necessity of making scientific progress and demonstrate their willingness to adopt and to further elaborate any improvements in their official standard. A step in the right direction will be taken if, at the coming meetings of local, state or national associations, the members of the pharmaceutical profession will declare their willingness to adopt a pharmacopœia that will include reliable and up-to-date tests for articles of

the organic materia medica as they occur in the ordinary channels of trade at the present time.

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## A PRACTICAL METHOD OF PREPARING A HEMATIN PRODUCT.

BY TORALD SOLLMANN, M.D.

(From the Pharmacological Laboratory of Western Reserve University,  
Cleveland, O.)

### I. INTRODUCTORY.

The comparative value of "inorganic" and "organic" iron preparations is still under discussion. It is not my purpose to enter into this question, but I take it for established that experimenters and the majority of clinicians acknowledge that organic iron preparations are indicated in certain conditions. Iron in the organic form—*i. e.*, combined in such a way that it cannot be demonstrated directly by chemical reactions—differs entirely in its therapeutic properties from the ordinary "inorganic" iron salts. It cannot be produced synthetically, any more than proteid-nitrogen can be produced from ammonia or nitrates. Preparations containing it can only be isolated from cells, either vegetable or animal. Typical of preparations of the former class are the nucleins; of the latter, the hemoglobin derivatives. The origin of the organic iron does not seem to be an important feature in its therapeutic action; so that the cost of the preparation and the pharmaceutic elegance of the product are the principal features which will determine the choice of a useful compound.

As a raw material for the manufacture of an organic iron, blood has certainly the advantage of a low prime cost. Raw defibrinated blood, however, is justly repellent to the æsthetic taste of most patients; and this holds, although to a less extent, for blood which has been simply dried or preserved with glycerin. This objectionable feature can be very largely removed by isolating the hemoglobin or one of its modifications. The dose is in this way reduced, the sanguinous character is disguised, and the raw animal flavor is entirely destroyed. To secure this end for medicinal purposes it is not necessary that the product should be entirely free from foreign substances, as long as the latter are reduced to a small amount and are of a harmless character.

The only reason why preparations of this kind have not become popular is to be found in their prohibitive price, due to the expense and to the small yield of the present processes of manufacture. The only products which come within the range of practicability are reduction-derivatives: hemogallol, prepared by the action of pyrogallol; and hemol, prepared by the action of zinc. These are rather further removed from hemoglobin than is desirable; there is always some danger of contamination with the chemicals used in their manufacture; the processes are not such as can be readily employed in the average pharmacy; and the cost of the preparations is still very high, especially when the effective dose is considered.

## II. PRELIMINARY EXPERIMENTS.

The problem which I set before myself was, therefore, to devise a process yielding a physiological hemoglobin derivative, by a method requiring only simple manipulations and apparatus, and which should still give a permanent product sufficiently pure for medicinal use, at a minimum cost. It is known that hemoglobin, taken by the mouth, is changed to hematin before absorption. This derivative was, therefore, the one which I aimed to isolate.

Hemoglobin and its derivatives are proteids, and agree closely with the other serum proteids in their physical and chemical characters. The precipitability and solubility are nearly the same, and hence arise the difficulties in isolating a pure hemoglobin product. A difference exists in the behavior to acidified alcohol and ether. Hematin is somewhat soluble in these media, whereas the other serum proteids are insoluble. This is the basis of the processes so far employed for the isolation of these products, and my first experiments were made along this line. On account of the very limited solubility of the hematin, the yield was so small, considering the large loss of the expensive solvents and the tediousness of the process, that the cost of the product would render it useless.

After some further experimentation it occurred to me that an efficient separation might be secured very cheaply by peptic or other digestion. Peptic digestion (in an acid medium) converts the serum proteids first into acid-albumins, then into albumoses, whilst hemoglobin is changed to acid-hematin. When the liquid is rendered neutral the acid-albumin and acid-hematin are precipitated, whereas the albumose remains in solution. It would therefore only be neces-



sary to carry the digestion so far as to convert all the acid-hematin into albumose, to obtain a precipitate of pure hematin on neutralization. This method, which I first tried myself, and then had controlled by one of my students, Mr. S. A. Young, gave eminently satisfactory results. I shall give the process in detail. We operated on quantities of 100 c.c. to 1,000 c.c. of blood at a time.

### III. PROCESS FOR THE ISOLATION OF THE HEMATIN.

#### *Material required:*

Defibrinated Beef's Blood <sup>1</sup> . . . . .	1,000 c.c.
Pepsin, U.S.P. . . . .	1.5 gm.
Dilute Hydrochloric Acid, U.S.P. . . . .	} Of each a sufficient quantity to make 18 to 30 gms. of hematin.
T. S. Sodium Carbonate, U.S.P. . . . .	
Thymol . . . . .	

(1) To the blood add 2,000 c.c. of dilute hydrochloric acid and 0.5 gm. of pepsin. Pour into large bottles, which should be a fourth filled. Add to each bottle a small crystal of thymol (the size of a split pea) and set the bottles in a large water-bath (a wash-boiler will answer the purpose), which is kept at a temperature of 40° C., for twenty-four to thirty-six hours.

(2) Render the contents of the bottles just neutral to litmus by the sodium carbonate solution. Fill the bottles with cold water and let them stand in a cool place until the precipitate has settled.

(3) Carefully decant the supernatant liquid, leaving the precipitate and adhering liquid in the bottles. Again fill the bottles with water, let settle, and decant. To the washed and moist precipitate in the bottles add now enough of a mixture of

40° c.c. of diluted hydrochloric acid,  
0.5 gm. of pepsin,  
960° c.c. of water,

to a third fill the bottles; add to each a small crystal of thymol, and digest at 40° C. for twenty-four hours. Then proceed by (2) (above). Decant a little of the clear liquid into a test-tube, and add an equal volume of soda solution and a drop of T. S. cupric sulphate. If this produces a pink color, repeat (3) (above). If the color is blue, proceed by the next paragraph.

<sup>1</sup> Blood which has been rendered non-coagulable by removing the fibrin. This is done by stirring the blood vigorously with a rough wooden stick for some ten minutes, beginning immediately after it has been drawn from the animal.

(4) Decant the liquid from the precipitate as completely as possible. Fill the bottles containing the moist precipitate with cold water, let settle, decant, and repeat this until the washings give only a faint turbidity with acidulated T. S. silver nitrate. When this stage has been reached, pour the precipitates into a large evaporating dish and dry on a boiling water-bath. Pulverize the product in a wedgewood or porcelain mortar.

#### IV. YIELD AND CHARACTERS OF THE PRODUCT.

On account of the low cost of the materials, the absolute yield is of little importance. We have found it to vary from 1·8 to 3 per cent. of the defibrinated blood, according to the care used in neutralizing and in decanting.

The product constitutes a black, granular powder, non-hygroscopic, odorless, and practically tasteless. Mixed with sugar or chocolate, it constitutes a very palatable confection.

It dissolves slowly in 1 per cent.  $\text{Na}_2\text{CO}_3$  and in 0·2 per cent.  $\text{HCl}$ ; less readily in 1 per cent.  $\text{HCl}$ . The solutions are turbid, reddish brown, and give the characteristic hematin spectra. The solution is hastened by heating. The solubility is not impaired by boiling the solutions or by heating the dry powder for twenty-four hours at  $100^\circ \text{C}$ . Strong  $\text{NaOH}$  yields a clear dichroic solution, which does not give the biuret test for proteids. The hydrochloric solutions do not give the Prussian-blue reaction with ferrocyanide, showing the absence of inorganic iron.

The ash of the product varies, of course, with the care with which it has been washed. In the sample made by Mr. Young, it was 9·2 per cent.; in one made by myself, 5 per cent. Dried at  $110^\circ \text{C}$ . to constant weight, the former sample lost 5·57 per cent. of water.

The determination of the ash, moisture and iron were made by Dr. R. A. Hatcher. I take this opportunity to thank him for his willing assistance.

#### V. IRON-CONTENT.

Two different samples were each found to contain 0·7 per cent. Fe. Nencki and Sieber's formula for hematin ( $\text{C}_{32}\text{H}_{32}\text{N}_4\text{O}_4\text{Fe}$ ) corresponds to 9·3 per cent. Fe. It follows from this that my product is far from being pure hematin. Nevertheless, its iron-content compares very favorably with that of other iron products. Even pure hemoglobin contains but 0·4 per cent. Fe (Hüfner).

VI. ADMINISTRATION.

As I have stated, the product is entirely unobjectionable to sight, taste or smell. It is absolutely non-irritant when taken by the mouth. It should be administered in solid form, either as powder mixed with two parts of sugar, or as chocolate tablets. The dose, as with other preparations of this class, would be about 1 gm. per day.

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EXTRACTION APPARATUS FOR THE EXHAUSTION OF  
WATERY LIQUIDS BY IMMISCIBLE VOLATILE  
SOLVENTS.

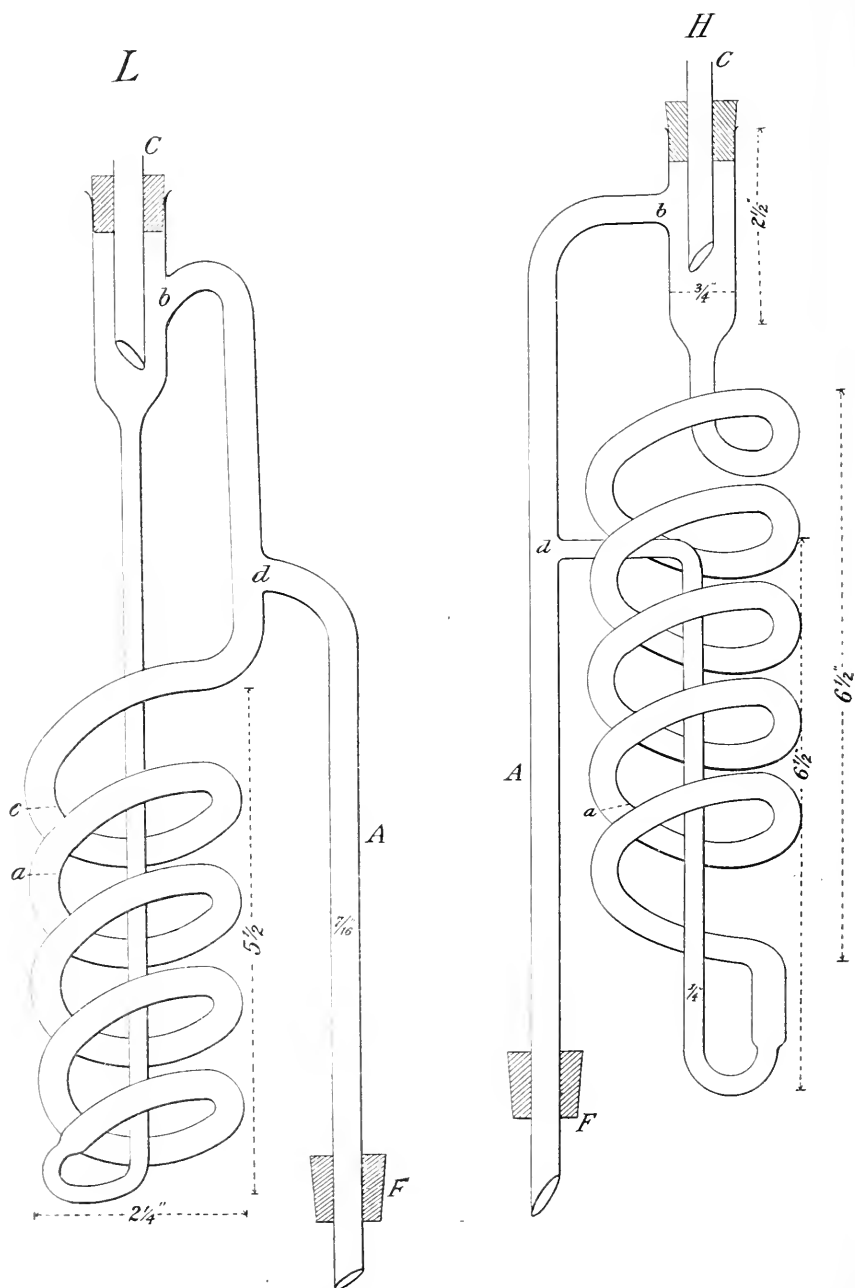
BY TORALD SOLLMANN, M.D.

(From the Pharmacological Laboratory of Western Reserve University,  
Cleveland, O.)

The use of the separatory funnel for the exhaustion of watery liquids by immiscible solvents has some objectionable features when the desired substances are but slightly more soluble in the extrahent than they are in water. The extraction must then be frequently repeated, and very large quantities of the expensive solvents are lost in the manipulations. These difficulties may be avoided by making the extraction continuous, employing some adaptation of the Soxhlet apparatus. The form which is here described is a simplification of a more expensive apparatus which I have seen used abroad, but which appears to be unknown in this country. I do not, of course, lay any claim to originality as to the principles of its construction.

The apparatus as modified is illustrated in the figures, which are drawn to scale and which are largely self-explanatory. *L* is for use with extrahents lighter than water, *H* for those heavier than water. The wider tubes have an external diameter of  $\frac{7}{16}$  inch, the narrower of  $\frac{1}{4}$  inch.

When the apparatus is to be used, a 100 c.c. or 250 c.c. flask charged with 30 c.c. or 100 c.c. of the solvent is attached at *F*. This flask is tared if a quantitative determination is to be made; 10 c.c. of the solvent are then poured into the expanded funnel-tube, followed by the watery liquid which is to be exhausted. The apparatus should be slanted so that none of the solution escapes through *b*. The watery liquid should not extend beyond the point



Modified Soxhlet Apparatus.

$a$  in the cut—*i. e.*, for the given dimensions it should not exceed 25 c.c. The flask is now set on a water bath and the funnel-tube is attached at  $C$  to a reflux condenser, properly supported. When heat is now applied to the water bath, the vapors generated in the flask escape through  $A$ , are liquefied in the condenser, and drop back into the funnel.

With light solvents, using apparatus  $L$ , the solvent displaces the water from the narrow tube, driving it toward  $c$ . As soon as enough of the solvent has accumulated to extend beyond the bend at the lower end of this tube, it will ascend in bubbles through the solution contained in the coils, and will be discharged through  $d$  back into the flask. From here it will repeat the circuit. If the heat is properly regulated, the apparatus will functionate perfectly automatically, and may be left to itself until the solution is entirely exhausted.

When the apparatus  $H$  is used for extrahents heavier than water the solvent descends in bubbles through the solution in the coils, ascends through the narrow tube and flows back into the flask through  $d$ . In other respects the apparatus functionates precisely like  $L$ . If the apparatus should break it can usually be readily joined by rubber tubing.

The extractors which I am using were made after my directions by E. Machlett & Sons, 143 East Twenty-third Street, New York, at a cost of \$3 for the pair.

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## A WAY OF RESTORING BROKEN SOXHLET APPARATUS TO USEFULNESS.

BY TORALD SOLLMANN, M.D.

Every one who has had occasion to work with Soxhlet extractors has doubtless been greatly annoyed by the fragility of this apparatus. The fracture occurs almost invariably at the point  $a$  (*Fig. 1*), precisely where it is impossible to repair, and the apparatus is rendered absolutely useless. The description of a simplified extractor published by L. D. Haverhill (*Drug. Circ.*, Vol. 46, p. 193) suggested to me a way of restoring such broken apparatus to some degree of usefulness, as follows:

The tube  $b$  (*Fig. 2*) is cut off smooth at the broken point. The tube  $c$  is closed by a small blowpipe flame, as close as convenient to

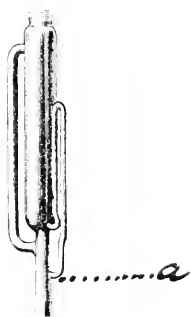


FIG. 1.—Soxhlet Apparatus.

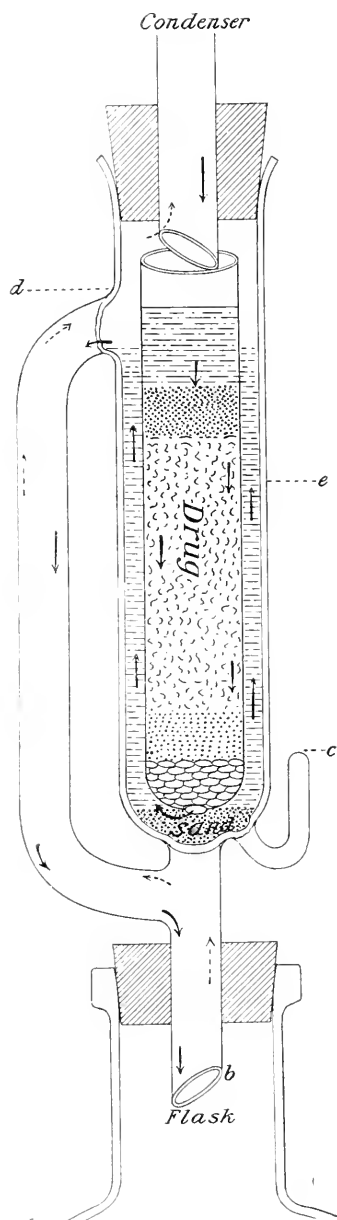


FIG. 2.—A Restored Broken Soxhlet Apparatus.

the body of the extractor. A strong test-tube is chosen, of such diameter that it will fit loosely into the tube *c*, and will reach above *d*. If no test-tube of sufficient length is at hand, the lower part of *c* may be filled with sufficient clean sand. A hole is now made in the bottom of the test-tube by heating the very end in a blowpipe flame whilst blowing into the tube. The apparatus is now ready for use. A loose plug of purified cotton is packed loosely into the bottom of the test-tube, on this is placed a layer of clean sand, then the powder to be exhausted, and another layer of clean sand. The apparatus is then mounted as in *Fig. 2*, and used as the ordinary Soxhlet extractor, the solvent taking the course indicated by the arrows.

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## THE EFFECT OF COLLOIDS IN DIMINISHING THE TOXICITY OF STRYCHNINE.

BY ROBERT A. HATCHER, M.D.,

Demonstrator of Pharmacology, Western Reserve University.

Upon the suggestion of Professor Sollmann, an investigation was undertaken with a view to learning by life-tests whether strychnine is destroyed in the tissues or not, and what influence certain conditions may have upon this destruction. This investigation is still in progress and will be the subject of a separate article, the present contribution being deemed of pharmaceutical as well as pharmacological interest.

In a series of sixty-two experiments upon frogs and nine upon guinea-pigs, the minimum fatal dose of strychnine sulphate, hypodermically injected, was found to be 0.0042 mg.  $\times$  G.,<sup>1</sup> while 0.0045 mg.  $\times$  G. invariably proved fatal, and 0.00435 mg.  $\times$  G. was fatal to three out of five. They usually became spasmodic in from three to eight minutes.

The average fatal dose for guinea-pigs was found to be 0.00475 mg.  $\times$  G.; this dose and all above were fatal, while all receiving less recovered. In this connection it is interesting to note that the dose necessary to cause convulsions in the guinea-pig is within 10 per cent. of the fatal dose, less quantities merely producing hyperexcitability, whereas in the frog, the smallest doses given—about 30 per cent. below the fatal dose—rendered them spasmodic.

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<sup>1</sup> 0.0042 mg.  $\times$  G. = 0.0042 milligrammes multiplied by the weight of the frog in grammes.

Ten mg. quantities of strychnine sulphate, having been injected into the tissues of rabbits and guinea-pigs respectively and extracted, was then injected into frogs and guinea-pigs in doses which were calculated upon the supposition that the whole of the 10 milligrammes was recovered, none being lost or destroyed in the tissues. Having noticed the absence of bitterness in the solution of extracted strychnine and, further, that the amounts theoretically present did not prove fatal in the usually fatal dose, while the convulsive action was considerably delayed, it was suspected that the colloid matter present was responsible for the diminished toxicity.

Calculating the dose of strychnine sulphate extracted from the tissues from the amount injected, and supposing none to have been lost or destroyed, a dose of 0.0084 mg.  $\times$  G. was survived by a frog, but to another 0.0086 mg.  $\times$  G. was fatal. This solution of strychnine sulphate, after repeated purification, proved fatal to one frog in the dose of 0.0065 mg.  $\times$  G., while another survived a like quantity.

In order to test the influence of colloids upon the toxicity of strychnine more accurately, strychnine sulphate was suspended in oil and in this way 0.006 mg.  $\times$  G. hypodermically proved fatal to a frog in 12 hours, evidently very near the minimum fatal quantity when so used, since toxic doses usually kill in about an hour.

The strychnine sulphate was then dissolved in thin mucilage of acacia and 0.0055 mg.  $\times$  G. was injected into a frog; the tetanus was delayed an hour, and recovery followed; 0.0065 mg.  $\times$  G., similarly employed, was fatal, but upon repeating the experiment, but using thick mucilage of acacia, recovery followed, though this dose exceeded the quantity fatal in ordinary solution by nearly 50 per cent.

In a guinea-pig 0.00495 mg.  $\times$  G. in thin mucilage caused convulsions in twenty minutes, followed by recovery; and upon repeating this experiment upon another guinea-pig, but using thick mucilage and finding no convulsive effect, the dose was increased to 0.0054 mg.  $\times$  G., using thick mucilage again; this also failed to produce any noticeable effect even after some hours, the animal dying later of bacterial poison.

From the results of these experiments it will be seen that the presence of colloidal substances diminishes the toxicity of alkaloidal poisons injected hypodermically as they do when given by the mouth.



Schmiedeberg states (*Arzneimittellehre*, p. 190) that one may take it with enough certainty that all indigestible colloidal substances, to wit, gums and mucilage of plants, not only themselves remain longer in the stomach and intestine, but also delay the absorption of other substances, and E. Leibert (reported by H. v. Tappeiner, *Archives internationales de Pharmacodynamie et de Thérapie*, Vol. 10, p. 85, 1902) showed that colloids markedly hinder the effects of dilute solution of chloral hydrate, and Rott (*ibid.*, p. 93) showed that this difference existed also, with or without gums, when the solution of chloral hydrate was introduced into the intestines.

CLEVELAND, O., May 7, 1902.

## THE NEW CONTACT METHOD FOR THE MANUFACTURE OF SULPHURIC ACID.

BY PROF. SAMUEL P. SADTLER.

The importance of sulphuric acid as the foundation of most chemical industries is generally impressed upon every chemical student. His attention is called to the fact that all the other mineral acids are obtained by its aid from the minerals or salts in which they are bound up in nature and that many of the elements are also obtained by reactions in which its use is found to be indispensable. It is to be remembered, too, that some of the most important organic products are only obtainable by the aid of the concentrated or fuming sulphuric acid, as alizarine and artificial indigo. The question of its manufacture on a large scale cheaply becomes therefore of the first importance.

The chemical reaction underlying its production is an extraordinarily simple one. It merely involves the union of sulphur dioxide with an atom of oxygen to form sulphur trioxide, and this takes up moisture with avidity to form the molecule of sulphuric acid. While this reaction of sulphur dioxide and oxygen is an exothermic one, it takes place very slowly, unless aided by some catalytic-acting material. In the well-known lead-chamber process, this material acting as the carrier of oxygen is a mixture of the oxides of nitrogen, obtained by the decomposition of nitric acid or a nitrate. This process, after having served for over a century as the only one capable of being used on a manufacturing scale, is likely to be replaced in the near future by what seems to be a simpler one,

although there is no difference in the fundamental chemical reaction. It merely replaces the gaseous carrier of oxygen by the use of a solid contact material, which by its catalytic action brings about the same change of sulphur dioxide to sulphur trioxide. There is this advantage, however, that these contact substances, acting at a higher temperature, can bring about the change in the absence of water and thus produce at once a stronger acid than chamber acid, or even sulphuric anhydride itself as a direct product.

In an address before the German Chemical Society, delivered October 19, 1901, and printed in full in the *Berichte der Deutschen Chemischen Gesellschaft*, 34, p. 4069, Dr. R. Knietsch, of the Badische Anilin- und Soda-Fabrik, gives an account of the manufacture of sulphuric acid by the new "Contact Method" as developed and patented by his company and now manufactured by them on a large scale. As this is the first detailed account of the new process, now being largely adopted by the manufacturers of sulphuric anhydride, and promising to replace the time-honored lead-chamber process for all grades of sulphuric acid, wherever new plants are being designed, it will be well to give its substance for general information.

The first discovery of the catalytic action of a solid body in the formation of sulphuric acid was made by Peregrine Philips, Jr., of Bristol, Eng., who took out a patent for the use of platinum in this connection. Seventeen years later, Schneider, a Belgian chemist, announced the catalytic action of pumice stone and thought that he had solved the problem of the ready formation of sulphuric oxide by its means, but the promise was not realized. In 1846, Jullion patented the use of platinized asbestos as a catalytic agent, but it was not used in connection with the manufacture of sulphuric acid until later.

Wöhler and Mahla later discovered the catalytic action of the oxides of copper, iron and chromium, but the discovery did not lead to any practical process.

The next step in advance was made by Clemens Winkler, who used an exact mixture of two volumes of sulphur dioxide and one volume of oxygen to form the trioxide, which could then be combined with much or little water, according to the strength of acid desired. This method was successfully applied to the manufacture of fuming sulphuric acid. For this purpose he heated ordinary sulphuric acid, which on decomposing formed water, oxygen and

sulphur dioxide, and condensed the water. The oxygen and sulphur dioxide, in the presence of the contact mass, then united to form sulphur trioxide. It was, however, not considered possible to use furnace gases direct, and for the manufacture of dilute acid it could not of course compete with the chamber process.

The Badische Anilin and Soda Fabrik, however, took up the effort to carry out the reaction, utilizing the sulphur furnace gases, and found that the dilution of these gases with nitrogen, contrary to Winkler's view, did not interfere with the reaction. They found that the presence of small quantities of solid impurities in the gases did interfere and hence the mixed gases had to be led through cooling and condensing tubes for quite a distance before allowing them to pass over the contact mass. In fact the greatest care had to be taken to eliminate a variety of impurities, which if present speedily rendered the contact mass inactive.

An examination of the furnace gases showed that, while the action on the contact mass was due partly to the presence of antimony, bismuth, lead, zinc and other substances in small quantities, the most injurious substance was arsenic, which was able, when present only to the extent of 1 to 2 per cent., to poison the mass and render it entirely inactive. The removal of the small amount of arsenic trioxide present in the gases as a mist was a problem which had been studied by many chemists, but had never been successfully solved.

After the expenditure of an immense amount of time, patience and money a method was devised by which, through cooling and washing and other processes, the exact details of which are not given, the gases were absolutely freed of all impurities, especially those in the solid condition. It was found that the ease with which the solid particles could be precipitated depended largely upon the rate of cooling, slow cooling greatly facilitating it. Although it was supposed that acid of a concentration of 90 per cent. could not act on iron, or, if so, would form sulphur dioxide, the decrease in power of the contact mass, which only began to appear after weeks or months, was shown to be due to the formation of hydrogen from the iron and sulphuric acid and the action of this on an arsenic compound to form arsine. Even the trace of arsenic contained in the small amount of sulphur, which passed through unprecipitated, was sufficient to injure the contact mass. But this was easily

removed, as was also the sulphuric acid which was formed in the furnace and which before had acted on the iron and the arsenic compounds by spraying the gases after they issued from the furnace where the pyrite was burned.

In the technical preparation of the fuming acid very little attention had been paid to the heat evolved when sulphur dioxide and oxygen combine, although it amounted to 22,600 calories. It was shown that the commonly accepted idea of the necessity of heating the contact mass very high, in order to produce the combination when the diluted furnace gases were used, was incorrect, and that both the yield and the life of the mass could be increased if the tubes containing it were cooled in order to carry off some of the heat generated in the chemical combination of the two gases. A form of furnace was devised, something like a tubular boiler placed on end, and the contact mass arranged in the upright tubes of the furnace in such a way that the pressure and amount of surface of the mass exposed in each tube was the same. Under these conditions the process is a continuous one and the mass retains its full power for a year or more.

The ordinary method of absorbing gases by passing through a series of vessels containing water or dilute acid would not entirely remove the sulphur trioxide even when a number of the absorbing flasks were used; but one vessel containing acid of 97 per cent. to 98 per cent. sulphuric acid absorbs it instantly and entirely.

In order to keep the concentration at this point the excess of sulphur trioxide is removed from time to time or water is added. By the method just described the experimenters were able to obtain acid of any concentration and mixtures of the acid and sulphur trioxide in all proportions.

Although the amount of product formed is not directly dependent upon the nature of the contact mass, yet the latter must be one which will give the greatest efficiency at about 450° C. All substances which reach their highest efficiency above this temperature will never cause a quantitative yield, no matter how long the gases may be kept in contact, as they will be partly regenerated if they have first combined. The only substance which fulfils these conditions is platinum, even members of the same family not showing an equal efficiency. The introduction of this method has enabled the Badische Anilin- und Soda-Fabrik to increase the yield of the anhydride from 18,500 tons in 1888 to 116,000 tons in 1900.

The incentive to the development of this practical contact process was the need of anhydrous or fuming sulphuric acid for the cheaper manufacture of organic products like alizarine, and especially the new synthetic indigo, but the process now developed is able to compete advantageously with the chamber process for all grades of sulphuric acid, and the close of the nineteenth century undoubtedly sees the old and familiar lead chamber doomed to early replacement by a simpler form of plant.

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## THE PRESENCE OF COPPER IN POWDERED DRUGS AND CHEMICALS.<sup>1</sup>

BY E. H. GANE.

From time to time, the author has been somewhat puzzled over the origin of small amounts of copper which have been detected in various powdered drugs and chemicals. Traces of copper have been found by investigators in the ash of various drugs, and have generally been attributed to absorption of copper by the plant from the soil, notwithstanding the fact that the place of growth of the drug may have been far removed from any known source of copper.

That this is not the source of the copper in all cases is shown by the fact that the metal could not be detected in the whole drug, and in the case of chemicals, the process of manufacture precluded copper contamination. As the amount of metal found was extremely small, and its occurrence quite casual, no detailed effort was made for some time to trace the source of the contamination, it being attributed either to careless handling or to the use of copper utensils for transferring the powder from the grinding mill.

The rejection, however, of several consignments of powdered ammonium carbonate, which had developed a blue mottled appearance, rendered it necessary to ascertain definitely the origin of the copper, so as to avoid further trouble from this cause. The search was not without difficulties. Every possible source of copper was eliminated, such as brass work around the mill, and close watch was kept over the grinding and sifting, so as to avoid contamination during these processes. The use of brass sieves and copper or tinned copper scoops was also abandoned in the milling room.

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<sup>1</sup> Reprinted from the *Journal of the Society of Chemical Industry*, February 28 1902. No. 4, Vol. XXI.

In spite of these precautions the same trouble would crop up at intervals, and it was not until attention was drawn to the driving belts that the source of the copper contamination was definitely located.

The various sections of a driving belt are riveted with copper rivets or stitched together with copper wire, and as the leather wears down from constant passage over the pulleys, the rivet heads are gradually raised flush with the surface of the belt, and are slowly ground down by passing over the pulleys, minute particles and sometimes fair-sized fragments of copper being thrown off from time to time.

The casual occurrence of the copper in the powders is easily explicable when the small size of the hopper feeding the mill is taken into account. Replacing the leather belt by one made of rubber has obviated further trouble.

This note is presented in the hope that it may save some manufacturers from similar trouble, and prevent inaccuracies on the part of investigators, particularly when examining the constituents of the ash of vegetable drugs.

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## PROGRESS OF PHARMACY.

A QUARTERLY REVIEW OF SOME OF THE MORE INTERESTING ADVANCES  
MADE IN PHARMACY AND MATERIA MEDICA.

BY M. I. WILBERT,  
Apothecary at the German Hospital, Philadelphia.

*Pharmacopæias*.—Several of the European Pharmacopæias are being revised, but so far none of them have been definitely announced for publication, and the only advance that is to be reported in this connection is an *Addendum to the Norwegian Pharmacopæia* (third edition, 1895). This addendum includes a total of twenty-three titles, thirteen of these being new drugs, and ten additions to, or alterations in, formulas for galenical preparations. The new admissions are: adeps lanæ cum aqua, albumen ovi siccum, chloretum hydrastinicum, liquor ferri albuminati, methyl sulfonalum, salicylas natriotheobromicus, sapo kalinus, serum antidiphthericum, solutio acetatis kalici, solutio subchloreti ferrici, subgallas bismuthicus, sulfas ferrosus siccatus, tribromphenolas bismuthicus. The changes in the galenical preparations are largely in detail of technique and are comparatively unimportant. (*Apotheker Zeitung*.)

No very valuable additions to pharmaceutical literature are to be recorded of the German commentaries in course of publication. *Hager's Handbuch der Pharmaceutischen Praxis* has been completed and very favorably commented on in the German journals.

During the past three months there have been a number of articles of more or less practical value commenting on the manufacture and use of compressed pills. The direct cause of these articles, especially those that have appeared in the German pharmaceutical journals, was a small book on the subject by F. Utz, Julius Springer (Berlin, 1901). In this book there are upwards of a hundred formulas for the manufacture of various pills, and, as was to be expected, many of them are not as practical or as desirable as they might or should have been. The discussion on these lines has, however, been broadened out considerably and has included the consideration of possible abuses arising from the use of preparations of this kind. The *Pharmaceutical Journal*, London, has also printed a series of articles, dealing largely with the manufacture of this particular class of galenical preparations; many of the formulas given in this series of articles are also rather unpractical, and should be avoided. It would appear that, despite the popularity of this particular class of preparations, comparatively little attention has been paid to their manufacture from a pharmaceutical point of view, or to their efficiency or use on the part of the medical practitioners. Especially is this true of us in this country, where this class of compressed pills, no doubt, originated, and where their manufacture has been and is practically in the hands of the manufacturing pharmacists.

An interesting complication has arisen in Germany in connection with the admission of various synthetic chemicals into the last edition of the Pharmacopœia, under a non-trade-marked name or title, and giving the trade name as a synonym. It appears that several German pharmacists have been under the impression that this matter of synonyms worked both ways, and have, as a consequence, run into trouble with the manufacturers, or, rather, patentees. For instance, a German pharmacist may dispense antipyrine for pyrazalon, but he cannot dispense pyrazalon on a prescription that calls for antipyrine. This, of course, involves a principle of common law, and would hold good in this country as well; so that if anything is to come from the oft-repeated suggestions of admitting these pat-

ented chemicals under a non-trade-marked name, this name must first be popularized, so as to induce medical practitioners to use it instead of the more familiar and usually widely advertised name given by the original manufacturer or the patentee.

There have been a number of reports on original investigations of drugs containing alkaloids. One of the more interesting is an investigation of the *Alkaloids of Tobacco*, by Pictet and Rotchy. (Quoted by the *Apothek. Zeit.*, 1902.) These investigators have isolated three new alkaloids from tobacco. Two of these may be separated from nicotin by fractional distillation, not being as volatile as nicotin. One of these newly discovered alkaloids is a liquid, and named by the investigators *nicotein*; it has the supposed chemical composition of  $C_{10}H_{12}N_2$ , is volatilized at a temperature of  $266^\circ$  or  $267^\circ$ , and is soluble in water and the usual organic solvents. Another, *nicotellin*, has the composition of  $C_{10}H_8N_2$ , and requires a heat of more than  $300^\circ$  to vaporize it. At ordinary temperatures it is solid, and by recrystallizing from alcohol may be obtained in the form of white prismatic needles. It is present in tobacco in but small quantities.

The third alkaloid is very volatile and is found mixed with the nicotin. It occurs in very small quantities and has as yet not been satisfactorily studied.

Among changes in the sources of old drugs it is interesting to note that *ginger* is being cultivated in Brazil and also in Central America. A sample of the Brazilian product has reached the European markets, and is said to be particularly firm, light in color, and to have a pleasantly aromatic odor and taste.

According to the *Pharmaceutische Zeitung*, a new process for obtaining iodine from seaweeds has been patented in England. According to the specifications of this patent, seaweeds are treated at high temperatures with diluted sulphuric or other mineral acids, and from the resulting liquids iodine may be obtained by various chemical means. The accompanying potassium salts are obtained by crystallizing, and the residue is to be washed, dried, and subsequently used as fertilizer.

The same paper (*Pharmaceutische Zeitung*), in commenting on *sugar of milk*, says that the American product, while inferior to the German, has entered largely into competition, even in the German markets, with the usual result of producing a decided decrease in price.



*Amyl salicylate*, or salicylic acid amyl ester, while not a very recent preparation, appears to be giving good results as an anti-rheumatic and sedative. It is described as being a colorless, refracting liquid, having an odor somewhat resembling salol, soluble in ether, alcohol and chloroform. It has been used as a substitute for methyl salicylate, applied externally in quantities of 2 or 3 grammes. It has also been given internally in doses of 0.20 six to eight times a day.

*Organic combinations of arsenic* are increasing at a rate that will soon bring them up to, if not ahead of, the organic salts of silver in number. Among the newer remedies we may mention:

*Arrhenal*, said to be monomethyl sodium arsenate; this is being brought forward as a substitute for the older sodium cacodylate or dimethyl sodium arsenate.

*Nco-arsycodyle*, a French preparation, probably analogous to arrhenal.

*Atoxyl* (*Pharm. Zeit.*, 1902) is a preparation of German origin, and is said to be the anilid of meta arsenic acid. It has been given in doses of from 0.05 to 0.20 subcutaneously.

*Magnesium cacodylate* has been recommended as being more soluble in water than the corresponding salt of sodium, and also containing a larger percentage of cacodylic acid.

*Marsyle*, ferric cacodylate, is supposed to be an efficient remedy in cases of neurasthenia, anemia, and various skin diseases, given in doses of 0.01.

*Guaiacol cacodylate-cacodiacol* has been reported on as being very unstable, being readily decomposed into its constituents.

*Glycerino arsenic acid* has been suggested as offering a favorable or promising method of administering arsenic; the similarity existing between combinations of phosphorus and arsenic is pointed out, and the possibility of substituting arsenic in the well-known salt of glycerino phosphate of calcium naturally suggests itself. (*L'Union Pharm.*, 1902.)

This proposed glycerino arsenate of calcium has been criticised in some of the German journals, who claim it to be an extremely unstable compound, and consequently not to be depended upon.

*Carbolic acid* is apparently coming into many new uses; among others the strong acid is being extensively used both in this country as well as in Europe, for washing or swabbing out infected or

broken-down wounds or ulcers. The acid is allowed to act for a few minutes and is then washed away with strong alcohol.

Alcohol has the property of arresting the caustic action of carbolic acid, and on this account is now generally conceded to be the most efficient and desirable antidote in case of poisoning by this drug. Quite a number of cases have been reported in which this antidote has given very satisfactory results. The great number of cases that are constantly being reported, in which carbolic acid has been given or taken, accidentally or otherwise, would warrant the widest possible circulation of the knowledge of an efficient antidote.

A mixture of equal parts of *carbolic acid* and *camphor* has been recommended as a topical application. It is said to be a bland but efficient antiseptic. Diluted with from three to five parts of olive oil, it has been used as a soothing dressing in burns, eczema, and erysipelas. (*Exchange*.)

A 2 per cent. solution of carbolic acid has been used in the treatment of tetanus, several cases having been reported where apparent favorable results have followed the subcutaneous administration of varying amounts of this 2 per cent. solution.

*Crurin*.—Quinoline bismuth sulphocyanate, formerly marketed with a 25 per cent. addition of starch, is now also sold without this addition, and has been used, with reported good results, as an injection in cases of gonorrhœa. (*Apothek. Zeit.*, 1902.)

*Formaldehyde*.—Raikow (*Chem. Zeit.*, 1902) reports having obtained absolute formaldehyde in a liquid state by absorbing the water contained in the commercial 40 per cent. solutions, with potassium carbonate, calcium oxide or calcium chloride. After adding any of these chemicals to saturation and allowing to stand, the mixture separates into two perfectly clear layers that may be separated by mechanical means. The resulting liquid formaldehyde, probably a mixture of various polymeric modifications, is soluble in water, alcohol or ether.

*Gluton*.—A dietetic gelatine preparation used as a food or as a substitute for albuminous food products, made by treating gelatine with an acid at a comparatively high temperature; neutralize with alkali and dialyse to free from crystallizable salts.

Gelatine treated in this way does not gelatinize, nor is it precipitated by alcohol. Gluton is a white powder that is readily soluble in water, the resulting solution being limpid, even at low tempera-

tures. It is said to have the same food value as gelatine, and may be used in connection with thirst-quenching drinks. (*Phar. Centralhalle.*)

*Glyconic acid.*—An oxidation product of cane sugar, described as being a thick syrupy liquid that does not reduce Fehling's solution; has been suggested as an available food in cases of diabetes. (*Apothek. Zeit.*)

*Glycosal.*—Monosalicylic acid glycerin ester; a white crystalline powder melting at about  $76^{\circ}$  C. Slightly soluble in cold water, more freely soluble in hot water or alcohol, but not readily dissolved by ether or chloroform. Miscible with glycerin, and readily saponified by alkalies or the alkaline carbonates.

Said to possess the antiseptic and antirheumatic properties of salicylic acid, and may be used in place of any of the salicylates to advantage. (*Pharm. Zeit.*, 1902.)

*Ichthyol.*—Sulphoichthyolate of iron, and sulphoichthyolate of calcium are being recommended for internal use in preference to the more soluble salts of ammonium or sodium, the former having the advantage of being odorless and tasteless.

*Ferrichthyol.*—The name given to sulphoichthyolate of iron; is to be given in doses of 1.00 or 2.00.

Several substitutes for ichthyol have appeared recently; one of these, *ichtammon*, being put on the market by F. Reichert, Breslau, is said to be obtained by destructive distillation from a bituminous shale formation. This distillate, subsequently neutralized with  $\text{NH}_3$ , gives a substance closely resembling ichthyol in physical properties, and its therapeutic value is said to be the equal of ichthyol in every way. (*Pharm. Zeit.*, 1902).

*Thigenol.*—A sulphonate of soda, said to contain 10 per cent. of sulphur; is freely soluble in water and diluted alcohol; has a slightly alkaline reaction. This compound has also been recommended as a substitute for ichthyol, and is said to be preferable on account of the absence of the disagreeable odor of the latter. (*Apoth. Zeit.*, 1902).

*Phenolphthalein.*—Also known or sold as purgo, is again mentioned as an efficient and reliable purgative, given in doses of 0.10 to 0.50.

*Solvosal-lithium.*—Lithium salolo phosphoricum is a powder soluble in 20 parts of water, and recommended to be used as a diuretic in doses of 0.25 three or four times a day. It may also be used

as a local antiseptic or antiseptic mouth-wash in solutions of 1 part of the substance to 200 or 500 of water. (*Pharm. Centralh.*, 1902.)

*Sodium bisulphate*— $\text{NaHSO}_4\text{H}_2\text{O}$ —is said to be useful in modifying water infected with typhoid bacilli, so that it may be drank without fear of infection. When used in the form of compressed tablets containing 0.30 of the bisulphate, one is dissolved in a glass of water, and, in addition to making the water harmless, it will impart an agreeable saline and slightly acid taste, that contributes materially toward quenching the thirst. (*Pharm. Centralh.*, 1902.)

*Sodium persulphate* and ammonium persulphate have been suggested and used as remedies to stimulate or improve the appetite, given in doses of 0.10 half an hour before eating. In Germany a solution is being sold under the trade name *Persodine*; this (*Pharm. Centralhalle*, 1902) is said to be made as follows:

2. Sodium persulphate.

300. Distilled water. Mix.

Give a tablespoouful half an hour before eating.

*Quinine for hypodermic use.*—A solution of this alkaloid may be prepared according to Gaglio (*Chem. Zeit.*, 1902) by dissolving 3 grammes of quinine hydrochlorate or hydrobromate and 1.5 grammes of urethan in 3 grammes of distilled water. This combination contains about two molecules of urethan to each molecule of the quinine salt. This of course recalls the fact that there are other chemicals that will form molecular combinations with quinine salts and in this way facilitate solution. Urea was suggested many years ago, and with the reintroduction of this remedy into active use the combination with quinine will probably be found applicable in some cases. Another chemical that appears to combine in a molecular way with some of the quinine salts is chloral hydrate; if we take, for instance, 3 grammes each of quinine hydrochlorate and chloral hydrate, they will readily dissolve in from 3 to 5 grammes of water, making a limpid solution miscible with water to any degree.

*Thebaine hydrochlorate* has been recommended in cases of neurasthenia, given in doses of 0.05 to 0.20. (*Pharm. Zeit.*)

Among the novelties in the administration of drugs we find *bromofarina* and *bromo-pan*; the first is said to be flour mixed with a certain amount of a soluble bromide salt and intended for the preparation of the bread or biscuit. *Bromo-pan* is evidently bread in the form

of a biscuit or roll, each bread containing 1 gramme of a bromide salt. (*Pharm. Centralhalle*, 1902.)

Another proposed novelty is *serum bromatum*. This consists of 6 grammes of sodium bromide and 1.5 of sodium chloride to 1000 of sterilized distilled water. It is said that quantities of 500 or more may be injected without risk or injury, in the same way that normal salt solution is used for transfusion.

*Serum iodatum* is the corresponding solution of an iodide, but is apparently made up of entirely different proportions. The formula given for this is as follows: Sodium chloride, 6 grammes; sodium iodide, 2 grammes; sodium sulphate, 2 grammes; to 1000 of water. This serum, used as mentioned above, has been tried with success in the treatment of syphilis. (*L'Union Pharm.*, 1902.)

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## RECENT LITERATURE RELATING TO PHARMACY.

### MODIFICATION OF BETTENDORF'S ARSENIC TEST. SOLUBILITY OF STANNOUS CHLORIDE IN ETHYLIC ETHER.

In course of an analysis of an unknown substance, Mr. de Jong, apothecary in Amsterdam, discovered that stannous chloride is soluble in ether.<sup>1</sup> He proceeded to make good use of his discovery in modifying Bettendorf's well-known test on arsenic. As all of us have a more or less troublesome experience with the peculiarities of this test, it seems to be a valuable improvement. Instead of mixing the fluid to be examined with the reagent (no need to go into details) and waiting for a somewhat vaguely defined coloring of the mixture, de Jong overlies the unknown liquid with the acidulated (HCl) ethereal solution of stannous chloride and obtains a contact ring (as in HNO<sub>3</sub> reaction with ferrous salts).

De Jong furnished the final touches on some incomplete literary information. Neither he nor your referent knows of a distinct statement. Credit is due, however, to Roscoë and Schorlemmer, Vol. 3, Part 1, p. 335, where they say: ethylic ether dissolves many inorganic compounds . . . ferric chloride (especially valuable to the apothecary for his *tinctura nervina* Bestuch), mercuric chloride, platinum chloride, *several* other chlorides. . . . And on page 337, various metallic chlorides form compounds with ether. One of the

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<sup>1</sup> *Ph. Weekblad*, March 27, 1902.

first of these was obtained by Kuhlmann by bringing together anhydrous ether and stannic chloride. . . . The *Annalen der Chem.*, Vol. 112, p. 223, and Vol. 114, p. 356, contains articles, by Buckton and by Cahours, on "Zinnmonoethylchlorid, Darstellung, Eigenschaften und Zusammensetzung." Buckton mentions a Zinndiethylchlorid also; but this has only a remote connection to our point. J. B. N.

A NEW METHOD OF DISTINGUISHING HUMAN BLOOD FROM THAT OF ANIMALS.

C. Tarchetti (*Gaz. degli Osped.*, May 19, 1901) describes a new procedure for this purpose: If into an animal (A) the blood of a different species (B) is injected, then after a certain time the blood of the animal (A) is found to be toxic towards blood of the species (B). Thus, by repeated injections into rabbits of human blood—10 c.c. on four or five occasions at intervals of about a week—Uhlenhuth and Wassermann got from the blood of the rabbit a serum which exhibits hemotoxic powers to human blood, not only in a fresh state, but also when dried and redissolved in normal saline solution. Ape's blood was the only other one which behaved like human blood. Wassermann and Schultze proceed thus: Dissolve the spot of blood to be examined in a little normal saline solution; filter; place 4 or 5 c.c. in two small test-tubes, to one of which (a) add 0.5 c.c. of rabbit's blood made hemotoxic as above; to the other (b) add 0.5 c.c. of normal rabbit's blood. A third control-tube (c) may be made with 4 or 5 c.c. of solution of the blood of any animal save ape or man in distilled water. Place the solutions in a thermometer at 37° C.; if the spot of blood be human, in an hour's time the tube (a) will show a turbidity or a flocculent precipitate, while (b) and (c) will be perfectly limpid. Tarchetti carried out similar experiments with human blood and that of animals, both fresh and dried, for more than two months on cloth, wool and knife blades, and found the method reliable. The reaction occurs almost as well at the air temperature as at 37° C. The solutions must be absolutely clear to begin with, and he finds distilled water better for this purpose than normal saline fluid, for it brings all the hemoglobin out of the corpuscles. He has found that the diagnosis can be at once made with the greatest certainty in a hanging drop under the microscope; a slight uniform precipitate is at once

formed, and in a few minutes is seen as islets united in a reticulate pattern, much resembling the arrangement of Ebert's bacillus agglutinated by typhoid serum. The same thing is observed in filtered aqueous solutions of dried blood. It is only after a long time (12 to 24 hours) that a similar appearance is seen in blood of other animals.—*Charlotte Med. Jour.; Pediatrics*, 1902, p. 359.

#### ARTIFICIAL INFANT FEEDING.

S. A. Visanska (*Pediatrics*, Feb. 15, 1902) says that endeavoring to feed a baby artificially, three important factors are to be borne in mind: First, the quantity of the food; secondly, the quality of the food; thirdly, the individual peculiarities of the child. The writer says that one of the most frequent mistakes made in feeding a baby is that of giving it a much greater quantity of food than it can possibly assimilate, with a result that a child either vomits it or passes it through the bowels in an undigested state.

Regarding the character of food to be given a child, that is its quality, it is evident that the more closely the food resembles mother's milk the more likely it is to agree with the child. The writer says that his experience has taught him that modified cow's milk is the ideal artificial food for feeding infants. He says that the method he has adopted for feeding babies is that of Professor Seibert, and that is to feed according to the weight and not the age of the child. Visanska says that it is of no advantage to have the milk from one cow; it is in fact a distinct disadvantage, for the great difference which exists between milk of different cows makes it impossible to prepare a proper imitation of mother's milk, according to any fixed rules, unless we should have individual cow's milk analyzed in order to determine in just what way the mixture should be made. Besides this, the milk of any cow is subject to variations from time to time, depending upon the nature of the food given it, the health of the animal and other factors.

#### COFFEE AND TEA AS PRECIPITANTS FOR POISONS.

Dr. Torald Sollmann, Assistant Professor of Pharmacology of the Western Reserve University of Ohio, reports some interesting experiments upon "Coffee and Tea as Precipitants for Poisons." (*The Journal of Medical Research*, January, 1902, 43-53.) After referring to the generally accepted opinion that strong tea and black

coffee are chemical antidotes against alkaloids and metallic poisons, he states that this belief appears to be based solely on clinical experience and upon the fact that both beverages contain some form of tannin, gallotannic acid being known to precipitate both of the above classes of poisons. The clinical results might be due to the physiological effects of the caffeine rather than the chemical action of the tannin, as in the use of coffee in opium poisoning. That the tannin of both tea and coffee should be gallotannic acid seems improbable in the absence of experimental support of this statement (which, apparently, has not been reported), since the different tannins are known to differ widely in composition and reactions. Ordinary tannin—gallotannic acid—is an anhydride of digallic acid.

Tea-tannin may be (Dragendorff, *Pflanzenanalyse*, 1882, s. 166) practically identical with gallotannic acid, or with quercotannic acid (Rocheleder quoted in *Beilstein*, 1897, Vol. 3, p. 688), or be an entirely different substance (Stenhase, *AMERICAN JOURNAL OF PHARMACY*, 1862, p. 254).

Coffee-tannin is radically different from tea-tannin, being a diglycosyl ether, of 3·4 cinnamic acid. The very markedly less astringency of coffee as compared with tea would indicate that the tannins of these two substances were not identical, especially when it is noted that unroasted coffee contains, according to Spencer (G. L. Spencer, "Tea, Coffee and Cocoa Preparations," U. S. Department of Agriculture, Bulletin 13, 1892), from 5·8 to 33·8 per cent. of tannin, while tea contains only from 4·8 to 15·4 per cent., the latter being a very rare figure. Notwithstanding this smaller content in tannin, tea is in practice usually preferred to coffee as a chemical antidote.<sup>1</sup>

In order to determine the chemical reaction of tea and coffee with different alkaloids and metals, and to ascertain how far the general statement of text-books that tannin precipitates "most alkaloids and metals" is true, Dr. Sollmann carried out the following experiments:

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<sup>1</sup> May there not be a larger percentage of tannin in unroasted coffee than in roasted? In other words, do not the destructive changes that take place in green coffee during the process of roasting destroy some of the tannin? As is well known, isolated tannin is markedly affected by heat—swelling, blackening and igniting, according to temperature (U. S. D., 1899, 100)—and green coffee on being roasted is heated to a temperature that is destructive of some of its constituents, including, possibly, some of its tannin.—J. W. E.



"A decoction of coffee was prepared by boiling for forty-five minutes ground, roasted coffee with ten parts of water, replacing from time to time the liquid lost by evaporation, filtering whilst hot, and percolating through the marc and filter enough hot water to make ten parts. A decoction of black 'English Breakfast' tea was made in a precisely similar manner. Both liquids were somewhat acid to litmus. The coffee became somewhat turbid on cooling. The tea showed a very pronounced diffuse precipitate, and became almost opaque in thick layers. This could not be removed by filtration through paper. It could be made to disappear by heating or by the addition of alcohol. On account of this turbidity the reactions were always compared with corresponding dilutions of the decoctions with water. Neither decoction gave any precipitate with dilute hydrochloric acid, nor with Mayer's reagent, in the proportions which were used. The tests were made by adding definite proportions of the decoctions to solutions of the substances to be investigated, and noting the resulting phenomena at once, and after standing. If a turbidity or precipitate occurred, a portion of the unfiltered liquid, in the case of alkaloids, was mixed with about one-fifth volume of 5 per cent. hydrochloric acid, and with one volume of alcohol, to test the solubility. Another portion of the liquid was filtered, and a part of the filtrate was put with more of the decoction. If no further precipitate occurred, a few drops of Mayer's reagent were added. In the case of metallic salts the decoction was added until a further portion ceased to affect the filtrate, and the latter was then tested for the metals. The proportions usually employed for the alkaloids were 2 c.c. of 1:100 aqueous solution of the alkaloid<sup>1</sup> to 1 c.c. of the decoction (expressed in the table as 1:150—3½ per cent.) or 5 c.c. each of 1:1000 solution of alkaloid, and of the decoction (expressed as 1:2000—5 per cent.)."

Details of the experiments are then given in extenso, after which the conclusions are stated as follows:

I.—*Precipitation of Alkaloids.*—Atropine, coniine, morphine and pyridine are not precipitated even in fairly strong solution by coffee. Tea precipitates them from strong, but not from weak, solutions.

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<sup>1</sup> Or one of its salts, brought into solution if necessary by the addition of a few drops of 5 per cent. H<sub>2</sub>SO<sub>4</sub>.

Aconitine, brucine, cocaine, lobeline, nicotine and pilocarpine, in weak solution, are only sparingly precipitated by tea; coffee does not affect them even when they are in concentrated solutions.

Apomorphine, the cinchona alkaloids, hydrastinine, strychnine, and veratrine in dilute solutions are precipitated efficiently by either coffee or tea, the latter being generally more efficient, except perhaps for veratrine and quinine.

The precipitation is incomplete with all alkaloids except apomorphine. However, the quantity of unprecipitable alkaloid is quite small in those which are said to precipitate from "dilute solution," since most of the alkaloid is removed from 1 : 2000 solutions.

The precipitates are somewhat soluble in dilute HCl, very readily soluble in dilute alcohol. The administration of the latter must therefore be avoided if these beverages (or tannin) are used as chemical antidotes in alkaloidal poisoning. Since the precipitates are not quite insoluble in water, as little liquid as possible should be given. The quantities of the decoctions should not be less than 3 c.c. of a well-boiled 10 per cent. decoction for each milligram of alkaloid.

II.—*Metallic Salts*<sup>1</sup>.—Tea is also the more efficient precipitant of metals, but the difference is not nearly so striking as with alkaloids. Both beverages are inefficient against arsenious acid or tartar emetic. They precipitate to a large extent, but not quite completely, the salts of cobalt, copper, nickel, uranium and zinc, and would be useful antidotes against the toxic members of this list. They precipitate practically completely the salts of aluminum, lead and silver. Mercury is partly precipitated by tea, but not by coffee, so that the former would be an antidote, the latter not.

III.—*Proteids (Eggwhite, Albumose and Gelatine)*.—These differentiate very sharply between the two tannins; whereas tea produces large precipitates, coffee leaves them unaffected, or renders them slightly turbid at most. This serves to explain the less astringent taste of coffee and its less deleterious effect upon digestion.

The reactions of tea bear a very close resemblance to those of gallotannic and quercotannic acid. The precipitant effects of caffeo-

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<sup>1</sup> The salts used were: Arsenious acid, tartar emetic, cobalt chloride, cupric sulphate, nickel sulphate, uranium acetate, zinc sulphate, ferric chloride, lead nitrate, silver nitrate, aluminum chloride and mercuric chloride.

tannic acid are weaker, but occur along the same lines. The greatest differences are seen in their action on proteids and on certain alkaloids, whereas other alkaloids and most metallic salts are precipitated almost equally well by both. An exception is formed by mercuric chloride, which is partly precipitated by tea, not at all by coffee.

J. W. ENGLAND.

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## CORRESPONDENCE.

### BOTANICAL NOMENCLATURE.

MAY 1, 1902.

DEAR SIR :—Replying to your request of April 23d, asking me for my views on "Botanical Nomenclature," I take pleasure in giving them. As is well known to readers of my publication, "Mycological Notes," my views on the subject are very radical. I advocate strongly the discontinuance in current literature of the use of personal names after the names of plants. I believe that the custom of citing personal names is conducive to more harm, more confusion, more synonyms, more invalid "new species," more changing of old names, than all other agencies combined. It is not denied by any one that the various names we have for a plant, synonyms, are both a great weight and a great hindrance to the science. Botanists meet and pass rules for the naming of plants, but they cannot agree on any set of rules, and never will as long as the members are vitally interested in the particular rules that perpetuate their own names and the plant names that have been proposed by themselves.

Botanical nomenclature is, theoretically at least, a language, and should reach stability by custom and good usage, and by that alone it will do so. Can we expect stability, when we offer a standing reward by which the man who wishes a change in a plant's name has his own name cited thereafter in connection with it? If this be not the cause of much name changing, it is no less a fact that under such a system, synonyms have reached their present unwieldy bulk and are growing every day, and I believe will increase to the end of all time, under present methods.

As long as a new combination, some "prior" generic name, some "prior" specific name, some slight variation in shape of leaf or bract or even color of anther, stands as a reward by which some men can cite their own names as authority for a new species, instead

of those of another man, trivial excuses for such acts will be found. It is no less justice to the men who are not afflicted with such a craving to conspicuity, than to prevent injustice, that the change of method be made.

There can be no denying the fact that a binominal, a combination of the generic and specific names, is the *name* of a *plant*, and that this alone is the name of the plant. If relieved of artificial inducements for changes, these binominals will gradually assume practical uniformity. It is a language, and by custom and use must reach stability, like any other language. What constitutes "good language" but accepted usage? If botanical writers were interested only in using good botanical language, they would select established names most generally in use by qualified men, for that is "good language," and gradually it would crystallize in reasonably permanent form.

It would, of course, change gradually; all languages change gradually, but we would be relieved of these "volcanic eruptions," overthrowing most of our names, simply because certain writers have peculiar views of "priority," that for one reason or another afford excuse to propose new combinations. But one might say, we must have some authority for our names. And so we must, and fortunately we have, and a good one, the "Index Kewensis." This work is modern; it should be accepted as a *dictionary* of botanical language, the same as we do with standard dictionaries of the English language. Let us use names of plants only as authorized in such works, in dictionaries of the language, and abolish personal names from all writings devoted to plants, such as manuals, journal articles, pharmacopœias, etc. Gradually, botanical nomenclature will then take on the dignity and permanency of a language.

Neither chemists, physicians nor pharmacists are interested in the different views of classification or nomenclature of the various schools of botanists or individual writers. Let the botanists fight that problem out among themselves. The authors of such works as "Index Kewensis" alone are called on to decide which view presents enough merit to warrant adoption. I strongly advocate the adoption of the names for the plants adopted in the "Index Kewensis," and the exclusion of all personal names after the names of plants.

Sincerely yours,

C. G. LLOYD.

Cincinnati, O.

## EDITORIAL.

### THE AMERICAN PHARMACEUTICAL ASSOCIATION.

The attainment of the fiftieth anniversary usually furnishes an occasion for congratulation, whether it be by a nation, a state, an association or an individual. As we watch the careers of individuals with interest, so with organizations and societies, we not only contemplate their immediate aims and purposes, but ask ourselves what they will stand for in years to come. And if they have stood the test of years, we are warranted in concluding that their endurance was due to some inherent force or underlying principle of action that received not only the support of the individual members but was approved by the highest and best sentiment of the time. That the American Pharmaceutical Association has stood this test stands to the credit of American pharmacy.

The American Pharmaceutical Association began its history on a plane that was intended to benefit the pharmacists of America for all time. How much the practice of pharmacy has drifted from, and how much it has been guided by, those cardinal principles as contained in the earlier Proceedings of the Association would require a master hand to treat with justice. Suffice it to say that this Association has enrolled in its membership every one of those master minds who have contributed so much to the elevation of American pharmacy. Beginning with the names of men like Procter, we find extending down to our own time men of the character of Squibb and Rice. Verily there is in the Proceedings of the Association a hall of fame with its immortals that we leave to others to treat at the time of the celebration of the golden anniversary by the Association on September 8th. If only something could be done to reach the rank and file of the pharmacists of America, to enthuse them with the spirit of the founders of this Association, and to show them that this spirit is still manifest in the work, we cannot but believe that there are many who are not members now who would become affiliated with the organization.

Since the organization of the Association in 1851 and 1852 the world has made greater advances—particularly in science—than in the thousand years preceding. Pharmacy and medicine each have profited by the advances of the sciences, and while we may well be discouraged with the condition of pharmacy in some quarters we

will find that this was also the complaint fifty years ago. A more hopeful view of the progress in American pharmacy will be had by reading the earlier Proceedings and comparing them with those of the past few years. Or, better still, we may say to those who have never attended the meetings of the Association—or who have never become enthused with its merits—that this next meeting in September will be an unusual opportunity for securing an historical knowledge of the Association as well as its purposes and conduct.

The President of the Association, as well as the Local Secretary, are active in their preparations for the meeting. The Local Secretary, Wm. L. Cliffe, has acted in accordance with a resolution adopted at the St. Louis meeting, September 21, 1901, and named a committee on arrangements for the meeting of 1902. The following are the members: Howard B. French, Harry L. Stiles, Joseph P. Remington, Clement B. Lowe, Mahlon N. Kline, Henry K. Mulford, Miers Busch, Richard V. Mattison, Walter A. Rumsey, Henry C. Blair, 3d; Geo. D. Rosengarten, Wm. A. Sailer, Walter V. Smith, Harvey H. Hentzer, D. E. Bransome, Jacob M. Baer. Mr. Cliffe is chairman of the committee.

#### THE MEMORIAL TO DR. CHARLES RICE.

We have already referred in this JOURNAL (pp. 44 and 148) to the movement inaugurated by the Board of Trustees and Committee of Revision of the United States Pharmacopœia for the purpose of erecting a monument over the grave of the late Dr. Charles Rice and of preparing a memorial volume commemorating his life and work. The committee cannot proceed in either one of these directions until sufficient funds have been raised.

While the Committee of Revision have taken the initiative in this movement, it is but natural to suppose, when we contemplate the life of him who with rare genius and unselfishness contributed so much to the success of the U.S.P. for three revisions that others should wish to join in the work of honoring his name. The pharmacists of the United States are therefore not only given an opportunity to co-operate in this movement but they are especially invited to do so. A number of drug journals have taken up the matter and have raised a considerable sum of money. The Committee on Rice Memorial "invite all to contribute to this fund."

If there has been any hesitancy on the part of any to contribute to this fund we cannot but believe that it has been due to a misconception as to the nature of the movement or where the contributions should be sent. We hope that all who desire to contribute to this fund will remit promptly, so that the work of the committee may be carried on without further delay.

All contributions should be sent to either Prof. Virgil Coblenz, 115 West Sixty-eighth Street, New York City, N. Y., or to S. A. D. Sheppard, 1129 Washington Street, Boston, Mass.

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## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

A LABORATORY MANUAL OF URINARY ANALYSIS. By Robert A. Hatcher, Professor of Materia Medica and Director of the Laboratory of Urinary Analysis, in the Cleveland School of Pharmacy; Demonstrator of Pharmacology in the Medical Department of Western Reserve University. 1902.

The object of the present work has been to prepare a manual which will give concise but sufficient directions for the examination of urine for clinical purposes. It may be compared to a good notebook recording thorough work or an abridged dictionary for ready reference. The work includes a treatment of the microscopical examination of the urinary sediments, as well as qualitative and quantitative chemical tests. The whole work is included in forty pages and ought to encourage the interest of both physicians and pharmacists in a work of this character, which can be performed so readily and is so valuable in the diagnosis of disease.

REVUE DES MEDICAMENTS NOUVEAUX ET DE QUELQUES MEDICATIONS NOUVELLES. Par C. Crinon. 9<sup>e</sup> édition. Revue et augmentée, Paris: Rueff et Cie, Editeurs, 106, Boulevard Saint-Germain, 106. 1902.

This work of Crinon's is quite well known, it having passed to the ninth edition. It includes many of the newer medicaments, as acetopyrine, agurine, gacamphol (camphorate of guaiacol), arsitriol (glycero-arseniate of lime), marsitriol (glycero-arseniate of iron), hermophenyl (mercury-phenyldisulfonate of sodium), honthin, iodipine, lecithine (phospholutéine), purgatol (purgatine), suc musculaire

(myoserum), tetranitrol (tetranitrate of erythrite) and vasoliments. Under many of the medicaments is given information concerning their preparation, properties, therapeutics, pharmacology and doses. The work is well done and will be appreciated, especially on account of the treatment of the glycerophosphates and allied compounds.

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### PHARMACEUTICAL MEETING.

The last of the series of Pharmaceutical Meetings of the Philadelphia College of Pharmacy for 1901-1902 was held on Tuesday, May 20th. Mr. Wallace Procter, a member of the Board of Trustees, presided.

The first paper announced on the program was on "The New Contact Method for the Manufacture of Sulphuric Acid," by Prof. Samuel P. Sadtler (see page 285), in which he referred to the reactions involved in the lead chamber process, and said that in this new process the reactions are fundamentally the same, the principal difference in the process being that the gaseous carrier of oxygen is replaced by a solid contact material, which by its catalytic action changes the sulphur dioxide to the trioxide.

The next paper was on "The History and Commerce of Coffee," by William B. Marshall, formerly Curator of the Philadelphia Commercial Museums. In the discussion which followed the reading of this paper Dr. Miller said that perhaps the Mohammedans were the most inveterate drinkers of coffee, and that they simply added hot water to the pounded and roasted coffee, and then drank dregs and all. He said that Mohammed forbade the use of alcoholic stimulants of any kind, and while his teachings are not strictly followed by the higher classes, still the Bedouins and lower classes are still abstemious in their habits. Some of them have taken kindly to coffee, hashish and opium, and of these coffee seems to be the least harmful, although when first introduced it was placed under a religious ban.

Dr. Lowe said that while coffee could not be looked upon as a food, it was a stimulant of considerable advantage, and that he thought the better it was clarified the less harmful it was. Mr. Marshall further said that few people could be said to be addicted to the coffee habit as to alcoholic stimulants, and that among life insurance companies the use of coffee was not given any consideration except



possibly where there are certain derangements of the liver, when the applicant is advised against its use. He furthermore said that in Turkey and in France the coffee was very black, and that perhaps it had been colored with graphite, although he had no positive information on this subject. Dr. Miller further said that a few years ago there was a considerable demand for whole flaxseed, the mucilage of which was extracted and used for varnishing coffee. Mr. Procter said that he understood that smaller quantities of stronger decoctions were used in foreign countries than here, which statement was borne out in the remarks made by Mr. Marshall.

- The next paper was on "Some Observations on a Recent Trip to the Madeira Islands," by Dr. Adolph W. Miller. The speaker stated that the name Madeira in Portuguese means wood, and the name was given on account of the dense forests which covered the islands when they were discovered. In referring to the several industries, he said that while the island was famous for its wine production, owing to the ravages of the *Oidium* and *Phylloxera*, the quantity was becoming considerably reduced each year. The soil is quite fertile, but owing to the mountainous character of the country irrigation is practiced. Dr. Miller referred to the enormous proportions of many of the commoner garden plants. The common geranium (*Pelargonium roseum*) attained the height of 5 to 6 feet; *Euphorbia Poinsettia*, 15 feet; *Ricinus communis*, 25 feet; fuchsias, 6 feet; flowers of callas, 12 inches in diameter; begonias, 6 feet. Among the interesting plants noted were Bougainvilleas, *Acacia farenisiana*, *Datura Bruganansii*, *Lagostræmia Indica*, *Opuntia Tuna*, *Clethra arborea*, etc. Over seven hundred species, representing nearly four hundred genera, are found on the island. Dr. Miller said that the climate was specially adapted to those suffering from lung trouble, and that it was largely visited by Europeans.

M. I. Wilbert, in a paper on the "Progress of Pharmacy," called attention to some of the more interesting advances recently made in pharmacy and materia medica (see page 290). He also exhibited specimens of the following: (1) Carbolic acid and camphor; (2) aqueous solutions of quinine hydrochlorate with urethan or chloral hydrate, both of which are employed hypodermically. Mr. Wilbert also called special attention to the newer arsenic preparations.

A special vote of thanks was tendered the speakers of the afternoon for their valuable papers.

W. S. Weakley sent a specimen of so-called *pure* ground flaxseed accompanied with the following notes: "The specimen contains the following materials: corn meal, wheat middlings, ground meal cake, paraffin oil in excess and a slight amount of adhering flaxseed oil. Enclosed find specimen of oil (benzin extractive) and exhausted meal showing yellowish particles of corn. After having made a qualitative examination of this sample it occurred to me that it might be interesting to see as to just what extent some wholesale houses were selling adulterated ground flaxseed, so I obtained three samples from various wholesale houses. Upon examination I obtained the following results:

"No. 1. Color in general about normal; upon closer examination yellow particles of corn were observed; the odor was quite different from that of a pure ground seed; oil found in excess. Microscopical examination revealed large quantities of corn and wheat starch, together with the characteristic cellular structure of corn and wheat. Upon being heated with glycerin the characteristic odor of roasting corn was observed. The oils extracted by benzin were found to be a mixture of flaxseed and paraffin.

"No. 2. Corresponded to above analysis excepting the presence of a slightly larger percentage of oil.

"No. 3. Color lighter than samples 1 and 2; presence of corn meal demonstrated both macroscopically and microscopically; the lighter color being due to the smaller amount of oil present, which seemed to be pure flaxseed oil."

Charles C. Drueding exhibited a number of specimens of chamois skins, including both the genuine chamois skin and the oil-tanned sheep skin. Mr. Procter, in commenting on the exhibit, spoke of the quality of the skins, and said that the gray skins were introduced some twelve or fifteen years ago by Drueding Brothers. Dr. Miller said that he thought the specimens were of considerable intrinsic value. Professor Kraemer announced that Mr. Drueding desired to donate the collection to the College and moved that a special vote of thanks be tendered him, which motion was unanimously adopted.

The chairman spoke of the success attending the present series of pharmaceutical meetings, and thereupon a vote of thanks was tendered the committee having them in charge for their work.

H. K.

# THE AMERICAN JOURNAL OF PHARMACY

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*JULY, 1902.*

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## CHEAP DRUGS, OR SOME OF THE FACTORS INFLUENCING THE QUALITY OF VEGETABLE DRUGS.<sup>1</sup>

BY HENRY KRAEMER.

While the earlier records of trade show that adulteration and substitution of articles of commodity were practised, it is very probable that this was not done because of the demand for a cheap article, but that the needs for the article might be met, particularly when the supplies were low. It is also probable that competition was instrumental in reducing prices, and that this was followed by the cheapening of the products.

To-day there is a great demand for cheaper articles, or "something just as good," and he is an exemplary merchant who can say, "we give you what you ask for regardless of our pecuniary interests, and we make quality the first consideration and price secondary in all our dealings."

There probably has never been a time when drugs of good quality could be so easily obtained in most cases as to-day. But as Dr. Rice said: "A great many members of our profession, it is feared, are afflicted with a chronic willful blindness in regard to purity and genuineness of drugs; many, at least, seem to care but little about the quality of the articles they receive, so long as they appear to be genuine and are salable."

A great many are paying the best prices for the poorest articles, as aloes, buchu, sarsaparilla, calamus, ginger, etc., and they do not

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<sup>1</sup> Read at the Pharmaceutical Meeting of the Maryland College of Pharmacy, February, 1902.

seem to know it. They accept the goods and complain simply of deterioration, without even ascertaining the commercial varieties. There are others, however, who cannot get drugs too cheap and they pay as little as possible for anything that may resemble the genuine and can be sold for it. It is self-evident that they who regulate their purchases on the basis of price alone will have offered to them deteriorated, admixed, adulterated and sophisticated goods, some of which are most ingenious products.

While it is true that there are some vegetable drugs that are not always easy to obtain in any quantity of satisfactory quality, such as pilocarpus, ergot, cannabis indica, and possibly others, still the majority of drugs may be obtained of good quality, providing the proper sources are sought and the worthless rejected, in season and out of season, and not accepted on any plea of the jobber, or because of lack of courage on the part of the retail pharmacist. The latter must, however, be careful to inquire into the quality of the drugs he is likely to purchase before he investigates their prices. To talk of prices before knowing the quality of drugs places the pharmacist in an unfortunate light, and is likely to deceive the wholesale druggist. Then, too, we must all appreciate that the consumer will in nearly all instances prefer the best quality, providing he is not led to believe that something else will answer just as well. It needs no argument to show that, in cases of serious illness, both the interests of the physician and the patient demand the best obtainable, and the latter is perfectly willing, in most instances, to pay for it. In other words, this is a matter of education when dealing with the public, and of having a thorough understanding with the wholesale druggist.

This brings us to the consideration of our subject, namely, "cheap drugs, what they are, and what causes them to be cheap." While now and then one may obtain a drug of an unusually good quality at a low price, still, as a rule, cheap drugs are inferior drugs. Of the various causes that make them inferior the following may be mentioned:

- (1) Lack of knowledge or want of care in collecting them.
- (2) Carelessness in drying and caring for them.
- (3) Insufficient care in garbling and preparing them for the market.
- (4) Inattention in preserving them and storing them
- (5) Accidental admixture in the store.

(6) Adulteration or admixture of other substances.

(7) Substitution of other drugs.

I propose to devote particular attention to the first four causes, as much more attention has in recent years been directed to adulterations and substitutions than the other causes, which I am sure are equally deserving of our careful consideration.

(1) The U. S. Pharmacopœia designates in a number of instances the age that plants shall be to yield the official drugs, as *digitalis* and *hyoscyamus*, and in some instances states at what time of the year they shall be gathered, as in the case of *taraxacum* and *castanea*, and in one instance even the locality in which they shall be grown, as *Cannabis Indica*. This constitutes a most important part of the definition, and will no doubt become more general as our knowledge of this subject increases. It should be mentioned in this connection, however, that the period in the life-history of the plant, when the medicinal principles are either in greatest amount or most efficient, should be mentioned rather than the season or the month, as these principles change with the life-period of the plant, and are independent of the seasons, the life-period varying with the particular locality and climate in which the plant grows.

*Conium* and *digitalis* not infrequently flower the first year, and while the drugs yielded by them may not be as active as those obtained from biennial plants, still one cannot say what cultivation may not accomplish in changing the character of the drug.

Then, too, we are apt to think of the plant as being inactive during the winter season, whereas most important changes of its constituents are continually going on, the nature of which in only a few instances and in a most general way have we a knowledge. For instance, inulin-containing plants have this principle in greatest amount from four to six weeks after the plant dies down, or from four to six weeks prior to the beginning of its vegetative activities. During the winter, as during the summer, larger amounts of other carbohydrates are present. In the same way starch-containing barks, roots and rhizomes yield before and after this quiescent period various other carbohydrates and oily products.

As a result of some thought along this line I have formulated the following general rules for the collection of various drugs:

(1) Roots, rhizomes and barks should be collected immediately before vegetative-life processes begin (in the spring), or immediately after the vegetative processes cease (usually in the fall.)

(2) Leaves should be collected when the  $\text{CO}_2$  assimilation process is most active. Usually about the time of development of the flowers and before mature development of fruit and seed.

(3) Flowers should be collected prior to or just about the time of pollination.

(4) Fruits should be collected near the ripening period (*i.e.*, full-grown but unripe.)

(5) Seeds should be collected when fully matured.

As showing the influence which the time of collection has on the quality of drugs and necessarily on the price, the following illustrations may be given: It is well known that when the fruits of conium are green they will yield over 3 per cent. of coniine, but when they change to yellow, the alkaloid diminishes rapidly in quantity, and therefore much of the commercial drug will not yield 1 per cent. of coniine. The same thing may be said of santonin: when the flower-heads are unexpanded they will yield over 3 per cent. of santonin; but just so soon as the flower matures there is a rapid disappearance of the anthelmintic principle. Dealers in insect flowers (*flores pyrethri*) know that those gathered when the flowers are closed produce the finest and most powerful insect powder, and it is worth nearly twice as much as that made from the half-closed or open flowers. *Podophyllum* should be collected in the spring when the plant is just coming out of the ground, the resin content being nearly twice as much at this time as at others. *Geranium*, likewise, should be gathered early in the spring prior to the flowering period. In a general way, we may say that roots and rhizomes should be compact, hard and heavy, instead of being light and having a loose and spongy texture.

It is also important to remember that some of the *compositæ* have two flowering periods in one year, as *taraxacum* and *anthemis*. Flowers of the first crop of *anthemis* are larger, whiter than those of the second crop, and command fancy prices. In the case of *taraxacum* this factor has probably not been considered, and may account for certain of the difficulties in obtaining a medicinally active drug.

It may be that the variation in quality of some of the commercial aconite is due to improper drying or extraction of the active principles; still there is no doubt but that much of the trouble with this drug is due to the variation in the time of collection in various countries as well as to its being collected from other species. In

England the tuber is collected in autumn from cultivated plants after the overground parts have died down, whereas, in Germany, the tubers are collected from wild plants during the flowering period, this being done to distinguish the particular species yielding the drug. The commercial drug may consist, then, of partially exhausted summer tubers, autumn tubers, or a mixture of both.

No doubt, much of the early opposition to *Rhamnus purshiana* as compared to *Rhamnus frangula* was due to the collection of the former at improper seasons as well as to the product being collected from other species of *Rhamnus*. It is well known that wild-cherry bark varies according to its position on the tree. Then, too, collectors are not always able to distinguish the species yielding the official bark. Stoeder has made the interesting observation that the pomegranate bark yielded by trees with white flowers is preferred by the natives of Java; next in value is the bark of the trees with red flowers, which are most common in Java and Europe; lastly, there is the variety with black flowers producing a bark which is still less valuable.

The age of the plant influences the nature of its products in some instances as in the case of coca, there being a slight increase in the amount of alkaloids produced in the leaves of the plant up to the age of about ten years; after twenty years there is a diminution in alkaloids, although the yield is fair in plants thirty to forty years old.

The position of leaves, as well as age, in influencing the nature and amount of active constituents, offers a most fertile field for investigation. In the case of eucalyptus, the product of a tropical tree, the Pharmacopœia specifies the leaves produced on older parts of the plant. In herbs it directs in a number of cases that the leaves and flowering tops be used. It is likely that there is a difference in the constituents of the leaves found on different parts of the same plant: for instance, in sumach, the upper leaves contain a larger proportion of tannin in June than the lower leaves, and as the season advances the decrease in tannin in the upper leaves is also much less than in the lower leaves. It is not unlikely that in this climate the older leaves of herbs, which are more or less withered and imperfect, are like autumn leaves deficient in medicinal activity.

The influence of the weather in affecting the quality of drugs is seen in certain instances. Bad weather at the time of harvesting of fennel will produce a drug having the appearance of an exhausted

fennel. Hedeoma, that is grown during a moderately dry season, produces a larger quantity of oil than when grown in a rainy season. On the other hand, a dry season is very unfavorable to the growth of certain drug-yielding plants as chamomile, causing a serious falling off in supply and a double increase in price.

It is well known that in the propagation of plants there is a difference in some instances in those produced from cuttings and those from seedlings. It is said that when rhubarb was first cultivated in England, seedling cultivation was employed, and the result was a rhubarb of inferior quality, which was greatly improved by propagation from offsets.

While we may not be able to make extended generalizations, it must be apparent, from the facts here presented, that the subject of the proper collection of vegetable drugs is of prime importance, and is deserving of the careful consideration of us all.

(2) Carelessness in drying and caring for drugs after they are gathered is a more frequent cause of inferiority than is commonly supposed. *Quercus alba*, when properly dried, has a refreshing odor and is very astringent. Kino is much altered if the juice is boiled prior to drying. Of course, where drugs are exposed to the weather for their preparation for the market the conditions are more difficult to control, but even here good judgement and care will save the material. In the distillation of lavender flowers, dry weather is selected for the work, as otherwise the spikes are less fragrant.

Preparations made from the fresh or green drug are considered more valuable in some cases than those made from the dry drug, and command twice the price of the latter. It is probable, that there is something in the supposition that the active principles are in a combination in nature more efficient than when otherwise combined or extracted. Unfortunately, experiments made to determine the relative value of the preparations of the dry and green drug have not been made upon specimens otherwise identical. One cannot take a fresh drug and compare its value with a commercial article, as the latter may vary considerably.

In some cases the Pharmacopœia specifies that the drug shall be kept a certain length of time before being used, as in the case of frangula. A similar specification should be made in regard to *Rhamnus purshiana*, but since the result of the changes on keeping are now ascertained, and since a similar effect may be obtained by



heating the bark at 100° C. for forty-eight hours, this specification seems no longer necessary.

In some drugs a sort of ripening process takes place in the drying, as in tobacco and vanilla. In still others a marked deterioration takes place if they are placed in heaps and allowed to ferment, as lavender and most other drugs yielding essential oils. Furthermore, in the preparation of oil of peppermint, the yield of oil is greater and the quality superior if the plants are allowed to dry and are distilled immediately or soon after drying.

Quite a number of drugs are not infrequently observed in commerce in a moldy condition, as taraxacum, veratrum viride, maranta, aconite, etc. The question as to what influence this mold has on the quality of the drug has not been cleared up. Some experiments that are being carried on at the Philadelphia College of Pharmacy may enable us to say something about this later. More than twenty-five years ago Dr. Squibb called attention to the fact that micro-organisms appeared to destroy the active principles in belladonna, and said that "if this be true of aconite, then moldiness would be a cause of inertness, as it is frequently seen moldy on arriving here, though the appearance of the mold soon disappears under the skilful hands of an energetic salesman." It should be stated, however, that a microscopic examination will soon decide the question as to whether a drug has been moldy or not.

The U. S. Pharmacopœia is very specific in stating that certain drugs should be carefully dried, as ergot, cantharides, etc. The British Pharmacopœia in the definitions of most of the drugs speaks of them as the dried drug. This is a very important matter and one deserving of very careful consideration, particularly in the case of seeds, fruits containing seeds, and any other product, as ergot, possessing, dormant life. While I have no results to present, I am inclined to believe that there is a marked difference in the therapeutic value of drugs in which the life is quickly destroyed and those in which the vitality is allowed to ebb out slowly. Ricinus seeds would be interesting material for investigation, the question being whether the oil obtained from a lot of seeds in which 80 or 90 per cent. are capable of germinating is not bland and agreeable and yet possessed of all the purgative properties of the oil ordinarily sold, as compared to that obtained from seeds dried at 50 or 60° C. Investigations have shown that in fennel fruits, which are the richest in volatile oil, from

70 to 80 per cent. are capable of germination. Ergot is ordinarily supposed to retain its virtues not longer than a year, yet it has been suggested that if ergot be dried in thin layers and the last traces of moisture removed, by exposure over lime or sulphuric acid, and then stored in corked yellow bottles, it will retain its superior quality for several years.

(3) A third cause affecting the quality of drugs is the contamination naturally occurring with the drug and which has not been removed in the preparation of the drug for the market. In the trimming of the roots and rhizomes there is a disposition in many instances to leave quite a quantity of the overground stem, as in aconite, senega and veratrum viride. I have examined aconite containing as much as 4 to 5 per cent. of stems, and in belladonna found over 6 per cent., while in ipecac nearly 3 per cent. was found.

In other cases the earth is not removed, and in geranium I have found nearly 10 per cent. of fine refuse matter.

There is a growing tendency to collect the smaller roots with the root bark, as in *gossypii radices cortex* and *rubus*.

In some rhizomes the roots are removed or are present in excessive amounts. The question of ascertaining the relative value of roots and rhizomes is an interesting subject for investigation. Drs. Dohme and Schmidt have done some work on *hydrastis* and found the roots less active than the rhizome, though still valuable. It was questioned twenty years ago whether the Pharmacopœia was justified in admitting the roots with the rhizome of *veratrum viride*. The German Pharmacopœia as well as our own Pharmacopœia admits both rhizomes and roots, although considerable *veratrum* is imported consisting entirely of rhizome. The U.S.P. specifies that *podophyllum* consists of rhizome and roots, yet it is doubtful if the roots are ever seen in the commercial article. On the other hand I have seen *cypripedium*, in which over 50 per cent. consisted of roots and the remainder consisted of rhizome with roots attached.

At the present time a large number of drugs are sold in a compressed form. This is done to reduce their bulk and thereby reduce the cost of freight and space in storage. While there is no special objection to this method, unless there is greater liability of the drug to become moldy, still it has been pointed out in the case of *cannabis indica* that the compressed drug called flat or Bombay ganjah, is an inferior product to the loose or "round-bundled drug," known

as Bengal ganjah. Holmes has therefore suggested that the latter be made official. This is probably due to the fact that an inferior drug is more likely to be used, because it is not so readily detected.

More than ten years ago a patent was taken out to grind the chips and sawings produced in cutting rhubarb root, and after mixing the powder with some adhesive substance, as gum arabic, the mass was then pressed or molded into the desired shape. While the medicinal quality of the drug in this form may not be impaired and is supposed to form a more stable product, still the method invites admixture of other substances.

While it may be disputed that commercial drugs are at present inferior to those formerly sold, it is a lamentable fact that the retail pharmacist does not, as formerly, go over his drugs and select the portions fit for use, rejecting the inert and damaged material. It is claimed that he has not the time for garbling of drugs, and we may well ask, "Who has the time?" Most pharmacists are purchasing their drugs in a broken or powdered condition, and while it cannot be denied that the latter may be obtained of a first-rate quality from some quarters, still it is admitted that drugs in this condition are more likely to be adulterated and of inferior quality; hence the necessity for a more intimate knowledge of this subject.

Modern methods of commerce require the progressive pharmacist to equip himself in order that the integrity of the profession be maintained and benefit accrue to humanity at large. While there are unusual opportunities for deception there have never been better facilities for its detection.

(4) The Pharmacopœia not only considers the subject of the collection of drugs, how they shall be dried and what portions shall be removed, as in aspidium and scilla, but also states how they shall be preserved and limits their time of keeping.

While it is generally considered that most drugs deteriorate on keeping, still this depends largely upon the manner of their preservation. Thus the Pharmacopœia limits the time of keeping of ergot and states how it shall be preserved; still a number of writers call attention to the fact that, if properly prepared and preserved, the time of keeping may be very much extended. In order to preserve ergot, Grover proposed the removal of the oil, and Moss found the drug thus treated to retain its therapeutic value for six and a half years. Zanon suggests placing the drug in alternate layers with sand and

keeping it in a closely sealed jar. Others grind the fresh ergot and preserve with chloroform in paraffin paper, while others first extract the oil with alcohol or ether. Lately it has been proposed to keep the drug by the use of formaldehyde. As to what influence the latter has on the therapeutic value of the drug has not been stated.

In the preservation of vegetable drugs it is necessary to consider the influence of temperature, air, moisture, the attacks of insects and, possibly, light.

It is of the first importance that the temperature in the room or part of the store devoted to the storage of dry drugs shall be not more than 60–70° F. and nearly uniform throughout the year. Drugs containing volatile principles require to be kept in air-tight containers, as the labiate and composite herbs and wild-cherry bark.

Air-tight tin cans are probably the most economical and satisfactory containers for the purpose, and Lloyd has suggested painting the edges of the cans with melted beeswax. Drugs are sometimes stored in wooden boxes or in drawers. This method is objectionable, not only because they are liable to deteriorate, but because the odors are communicable from one to the other. The storage of drugs in parcels is the worst form of preservation, particularly, as is usually the case, when the different parcels are stored together.

Those drugs that are difficult to dry, as the inulin-containing drugs, should be kept in containers having a number of apertures, to allow evaporation to take place. Unless provision of this kind is made, molding of the drug may develop. From experiments that I have made I have no doubt but that the spores of *ustilago* will develop on any drug, the reserve materials of which are chiefly carbohydrates.

The preservation of drugs against the attacks of insects is, unfortunately, overlooked. Most drugs are subject to their depredations, and are usually attacked by the insects in the larval stage. These insects belong chiefly to the *Lepidoptera*, *Coleoptera* and *Diptera*. The *Lepidoptera* are the most destructive, and include principally *Tinea zea*, or cornmeal moth, which, during its larval (the caterpillar or grub) stage, is known to attack aconite, capsicum, ergot, lappa, linum, rheum, taraxacum and many other drugs. Among the *Coleoptera* may be mentioned various members of the *Ptinedæ*, as *Ptinus brunneus*, *Anobium paniceum* and *Lasioderma serricorne*, which attack the spices chiefly, as capsicum, cinnamon and pimenta.

Chief among the Diptera is *Trypeta arnicivora*, which is found in arnica flowers.

For the destruction and prevention of the attacks of these insects a number of substances and methods have been employed, the simplest method of all being to expose the drug to a temperature of about 100° C. This method is, however, open to objection, as there is liability either to decomposition or loss of active principle. A weak solution of carbolic acid has also been suggested but, of course, this is also objectionable. Camphor and tar-camphor have been employed, but it is doubtful if they should be used, unless in the case of animal drugs. In some instances, as with nutmeg and ginger, the drug is sprinkled in the drying-room, and when packed for market, with quicklime. Benzine and carbon disulphide have been proposed, but these are of a disagreeable odor as well as inflammable. Ether has been suggested, but it is very volatile and inflammable. The use of formaldehyde should proceed slowly until it is certain that it has no harmful effects, especially when used in the preservation of herbs used for teas for children, and orris root which is used for teething infants. The use of chloroform as a preservative has been sanctioned by the U.S.P. in the case of ergot, and is probably the best preservative that has been proposed.

It is extremely important to know what to do with drugs that have become worm-eaten. Recently it has been suggested to kill the larvæ, and then sift them out. This may be done in cases where the active principle is unimpaired and is to be extracted. Schimmel & Co. have shown that the essential oil of nutmeg is apparently not altered, even though obtained from worm-eaten seeds. In fact, the commercial oil is largely manufactured from the worm-eaten seeds obtained in Holland by garbling. But where the drug itself is to be used, the drug so affected should not be used. Who can determine what the effect on an open sore would be of a poultice of flaxseed containing thousands of larvæ of *Tineæ*? In the light of modern hygiene we should be as scrupulous in our selection and care of flaxseed and mustard as we are of drugs otherwise used in prescriptions. Even in the giving away of licorice root to children we should be careful to hand out only good solid pieces. Recently, Sawyer has stated that the mite found in vanilla bean does not unfit it for its various uses. This is, however, doubtful, particularly where it is to be used directly in the material to be flavored.

(5) Additional admixture in the store or warehouse is a subject that I do not need to dwell upon. Many admixtures undoubtedly arise in this way, for it is only in some such manner as this that the presence, for instance, of allium in asclepias could be accounted for.

On account of the limited time at my disposal, and also because this subject has been so frequently and generally considered, I merely wish to give one thought in connection with the subject of admixture, sophistication, adulteration and substitution.

The drugs coming from foreign countries are examined at the customhouse before they are admitted, and the spurious ones are likely to be rejected. This has been most beneficial to the commerce of drugs in increasing their quality. Collectors and distributors cannot afford to have the cases of rejected goods thrown back on their hands, or finally sold in some quarters at 50 per cent. under current rates. Foreign dealers have, therefore, learned the wisdom of supplying the better grades of drugs, and adulterated specimens, as of opium, are becoming rare. Inferior drugs do, however, sometimes find their way into the market. While it is believed that considerable laxity has prevailed in the Appraiser's Department, still this inspection on the whole has tended to improve the quality of imported drugs.

From a limited observation I am inclined to consider that American drugs are equally, if not more, inferior in quality as a rule than those imported. It seems to me that if an internal Governmental inspection could be made of our domestic drugs, it would have a most beneficial influence on their quality.

I am aware of the difficulties attending legislation of this kind, and of some of the reprehensible practices of those vested with the authority of the law; still progress is being made, and the attitude of the Board of Pharmacy in New York State is commendable in so far as it applies to the retail pharmacist there; but this does not seem to reach the bottom of the trouble. In my opinion there should not only be careful and rational inspection of the goods of the retail pharmacist, but also of the products of the jobbers and collectors.

As things are conducted at present, the main responsibility lies with the retail druggist; and while I do not deem it advisable to reduce his responsibilities, still the more all concerned share in this responsibility, the greater and more rapid will be the improvement,

in quality and uniformity, in the strength of drugs and their preparations.

Finally, I refer you to the notes by Dr. Squibb on rhubarb in the Proceedings of the American Pharmaceutical Association as being admirable essays, in that they show the responsibility of the pharmacist in buying drugs and making preparations therefrom. They contain a lesson which has been learned well by a few successful pharmacists and manufacturers, but the great rank and file have not appreciated the fine points, and the result has been that physicians who at first prescribed a few of the special products of manufacturers because they knew the care and attention which was being devoted to their manufacture, now are specifying certain manufacturers' products for nearly all the ingredients which they need in their prescriptions. This will be done until pharmacists generally learn the lesson that cheap goods are generally poor in quality, and that to shift the responsibility upon some one else is not to their credit, and that, furthermore, brains and ability must be coupled with conscience and industry in the making of every medicament prescribed by the physician or called for by the people.

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## USEFUL PRODUCTS OF THE CENTURY PLANTS.<sup>1</sup>

### A LESSON ON MEXICO.<sup>2</sup>

BY WILLIAM B. MARSHALL,

Former Curator of the Philadelphia Commercial Museums.

In recent years Mexico has become a progressive country, and, although not ranked among the great powers, it has taken an honored place among the nations of the world. Its people come into contact with the rest of the world in nearly as many ways as do the people of the United States, but in lesser degree. The foreign commerce of Mexico, represented by the value of its imports and exports, already large, is increasing in importance each year.

The principal materials imported into Mexico are machinery, cotton textiles, iron and steel, wines and liquors, wool textiles, paper,

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<sup>1</sup> Reprinted from *Journal of Geography*, pp. 6-17, January, 1902.

<sup>2</sup> Continued from the December *Bulletin of the American Bureau of Geography*, Vol. II, No. 4, p. 328. The electrotypes used in connection with this article were furnished through the courtesy of the McCormick Harvesting Machine Company, Chicago.

textile fibres. Mexican capitalists and industrial leaders are making efforts to manufacture more and more of these materials in Mexico, in order to gain the profits from their manufacture, give employ-

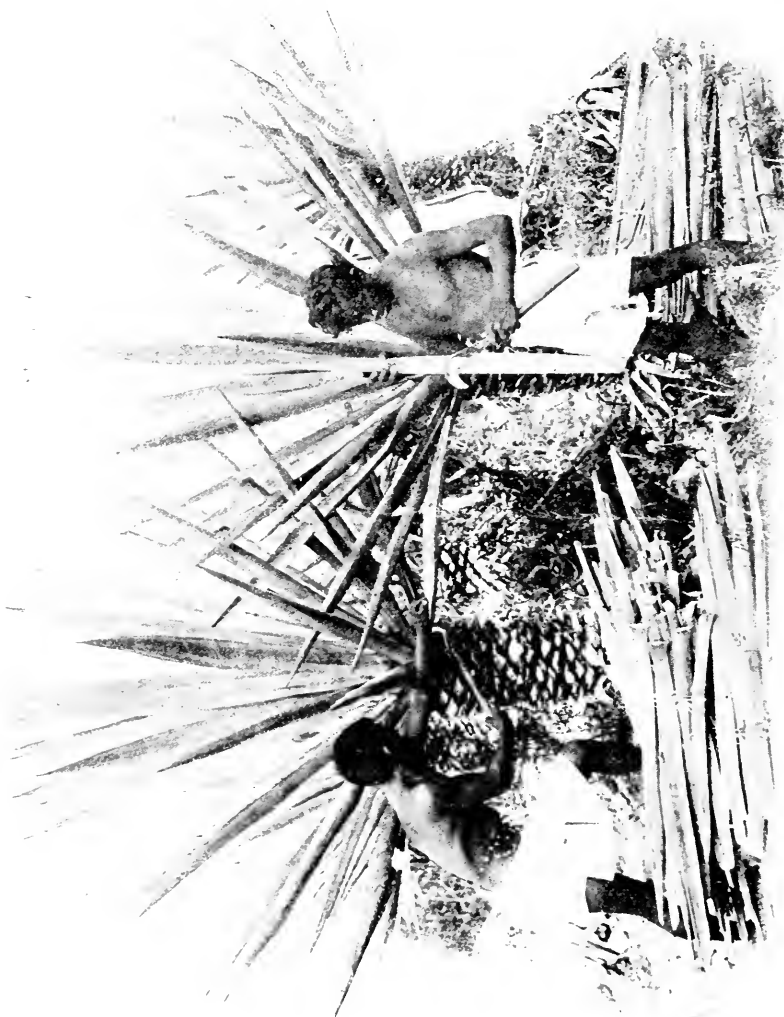


FIG. 1.—The leaves are cut with a curved knife. As each leaf is gathered it is trimmed along both edges to remove the prickles. (Page 326.)

ment to a greater number of their people, lessen the cost of the goods, and keep in Mexico the money that must be paid for them. The chief exports of Mexico are silver, henequen, gold, coffee, cattle,



copper, lead, hides, precious woods and zacaton root, the values of which are usually about as in the order given. In the production of silver, Mexico contests first place with the United States. She produces all the henequen of commerce.

Henequen (pronounced hen'e-ken) is a coarse vegetable fibre from 3 to 5 feet long. Its color is pale-yellow, nearly white. In Mexico the fibre is known by many names, the correct one and that most commonly used being henequen.<sup>1</sup> In the United States it is often called henequen, but more commonly sisal (pronounced sis'al) or sisal grass, or sisal hemp. The name sisal is given it because it was formerly exported from the port of Sisal on the northern coast of Yucatan.

The plant which yields sisal fibre is a species of agave (pronounced ah-ga'va) or century plant, known to the botanists as *Agave rigida sisalana*. When growing in our greenhouses we refer to it as a century plant, but not as *the* century plant. It is very similar to the common century plant and belongs to the same group or order of plants (*Amaryllidaceæ*), all of which, although there are about 125 species, resemble each other in a general way, just as all species of violets resemble each other. The full grown sisal plant has a thick stalk about 3 or 4 feet high, bearing at the top a number of long, broad, stout, fleshy leaves, with short, sharp spines along both edges, and a longer sharper spine at the tip. The flowers, of which there are several thousand, are borne on horizontal branches near the top of a pole-like flower-stalk from 20 to 30 feet high. The stalk and flowers resemble a tall candelabrum with numerous brackets, each bearing hundreds of lights. The fibre occurs as threads running the entire length of the leaf from the base to the apex. It is embedded in a great amount of white pulp.

<sup>1</sup>There is much confusion regarding the names applied to this fibre. Henequen is used in a generic sense to include all the long agave fibres grown in Southern Mexico. In a restricted sense it is applied to a finer, whiter fibre than that usually designated as sisal. There is some doubt as to whether the sisal and henequen are yielded by different species of agave or by different agricultural varieties.

*Maguey* is a term used in a generic sense to designate various species of agave and the products obtained from them. In a restricted sense maguey is applied to the sap-yielding varieties. *Ixtle* is a term used to designate the short varieties of agave fibre and is applied also to the fibre of various other plants.

## THE PRODUCTION OF THE FIBRE.

The sisal plant grows wild in many parts of Mexico and Central America, being hardy and able to thrive in many places where the soil is too poor to support other vegetation. Because of its commercial importance, regularity in the supply of the fibre is necessary to meet the demands of manufacturers; hence but little dependence is placed upon the wild plants as a source of supply. Nearly all the sisal used is grown on large plantations devoted to its cultivation.

The young plants may be grown from seeds, or from pole-plants, *i. e.*, young plants which form on the branches of the flower-stalk and drop to the earth and take root; but the method of propagation universally adopted is to transplant the suckers or shoots which spring up about the mother plant. The young plants are set out in rows from 6 to 10 feet apart. A less distance between the rows would render the plantation almost inaccessible because of the sharp spines with which the leaves are armed, and which often inflict serious wounds on the laborers. At the end of five years the first crop, consisting of eight or ten leaves from each plant, is harvested. For about twelve to fifteen years after this each plant yields about a dozen leaves per year, then dies and is replaced by a young plant. The labor is performed by Mexican Indians, usually under the direction of white overseers. The leaves are cut close to the stalk of the plant, with a curved knife fastened in the end of a handle about 12 inches long.

As each leaf is gathered it is trimmed along both edges to remove the prickles, and the stout spine at the tip is cut away. The leaves, called *pencas*, are then made up into bundles. On small plantations these bundles are removed from the field on the backs of men or burros. The large plantations are traversed by tramways on which flat cars drawn by burros are run to all parts of the fields to be loaded with bundles of leaves to be taken to the factory.

On a small scale the fibre is extracted by macerating the leaves in water to soften the pulp, which may then be easily scratched or combed away. In the factories the work is done on a large scale by various types of machinery, all of which first crush the pulp and then scratch or comb it away from the fibre. After the fibre is extracted it is dried in the open air. The drying-yards have in them a great number of posts planted in the ground, with pieces nailed near the top forming crosses on which the fibre is looped; or the posts are

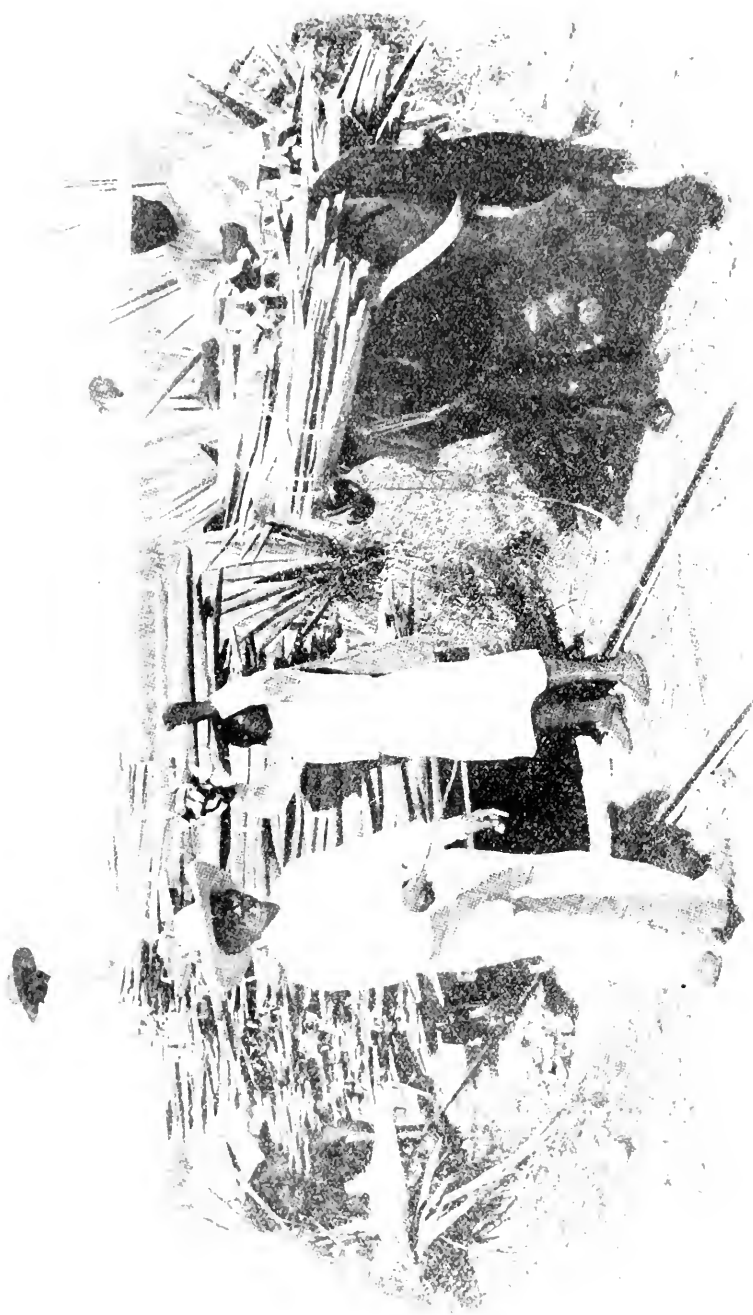


FIG. 2. —The large plantations are traversed by tramways, on which flat cars drawn by burros are loaded with bundles of leaves to be taken to the factory.

connected by a number of rails over which the fibre is hung. When dry the fibre is baled in powerful presses in order to make it more convenient in handling, storing and shipping.



FIG. 3.—The drying yards have in them a great number of posts connected by numbers of poles over which the fibre is hung.

Yucatan is the great sisal-growing region—especially the portion of it surrounding the capital, Merida. In this district the sisal plant is almost the only vegetation. Several towns, notably Merida and

Progreso, the port from which sisal is exported, are wholly dependent upon this industry. Were it not for this industry the whole north-western portion of Yucatan would be deserted.

"Thanks to its trade in henequen, or agave fibre, of which from 40,000 to 60,000 tons are annually exported, Merida has become the converging point of several lines, which, when completed, will cover the whole peninsula with a network of railways. For the present, however, the capital is connected only by a road with its ancient port, the little town of Sisal, at the northwest corner of Yucatan. From this seaport the henequen takes its English name of sisal hemp, by which it is known to the trade. The price of this valuable fibre has increased six-fold since the middle of the present century. The roadstead of Sisal, being exposed to the dangerous north winds, was abandoned in 1871, when a new *marina* was founded on the coast due north of Merida, with which it is connected by a railway 22 miles long. The line is carried over the coast lagoon by a strong embankment. The new town, which replaces the old Indian village of Tuxula, has already justified its name of *Progreso*, although the only advantage it enjoys over Sisal is its relative proximity to the capital. To shipping it is equally inaccessible, large vessels having to anchor in an open roadstead from 3 to 6 miles from port. So dangerous is the roadstead that steamers and sailing vessels are always ready to weigh anchor and escape to the high sea. Towards noon every day communication with the shore becomes almost impossible, owing to the violence of the surf under the action of the fierce northern gales." —"The Earth and Its Inhabitants," Elisée Reclus, 1891, D. Appleton & Co., N. Y.

#### EXPORT AND MANUFACTURE OF THE FIBRE.

The United States takes nearly all the sisal hemp exported. Several large manufacturing establishments in this country maintain agencies in Yucatan for the purpose of purchasing the fibre and keeping thoroughly informed as to the condition of the trade, the probable supply and possible variation in price.

Sisal hemp is one of the few important raw materials of the cordage industry in the United States, and almost the whole quantity imported is used for making ropes and binding twines. In Philadelphia and other cities there are extensive cordage works

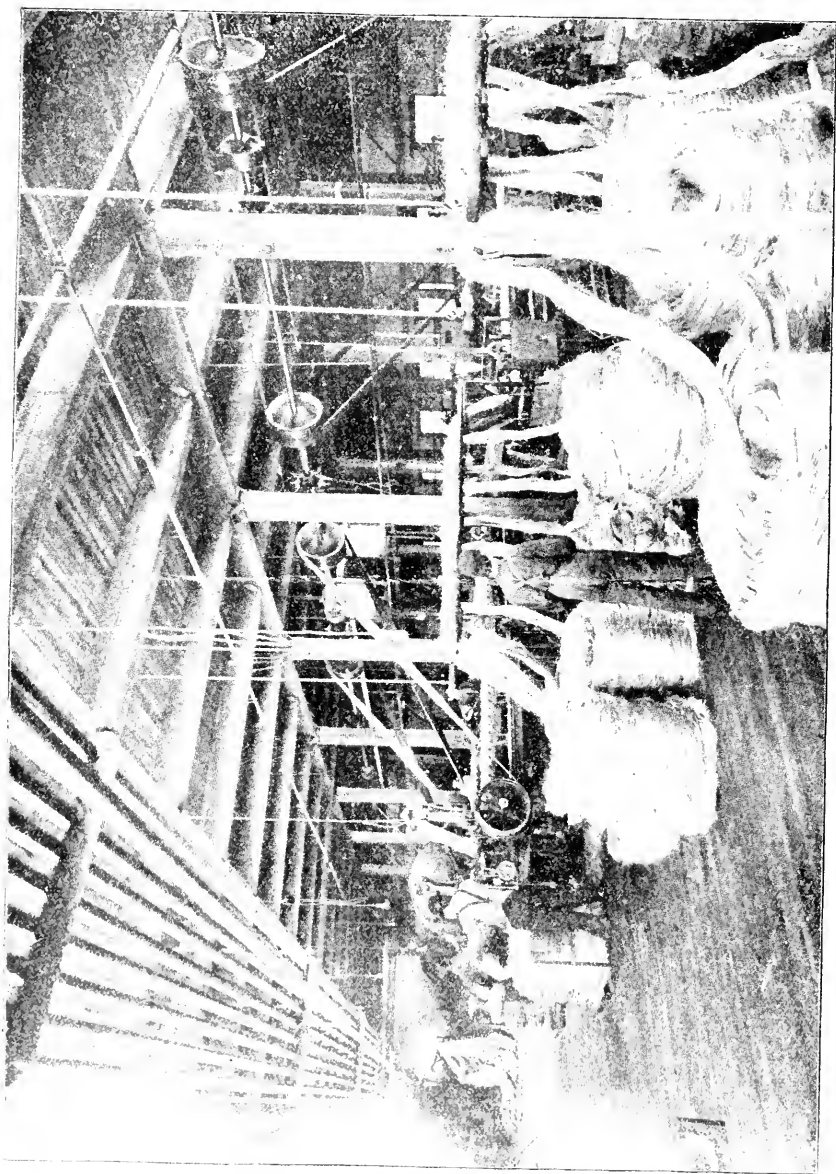


FIG. 4.—Preparation-room in the McCormick Mills at Chicago. First process in preparing the fibre for spinning.

which annually use large quantities of this fibre. Much of the binding twine used on harvesting machines, to bind the grain into sheaves as it is cut, is made of sisal. Some of the great establishments which make these harvesting machines, notably the great works located in Chicago, have their own twine mills employing hundreds of men and women, and their twines are sold in all parts of the world wherever modern agricultural machinery is in use.

Manila hemp of the Philippine Islands is almost its only competitor in the binding twine factories. In the cordage factories Manila hemp, sisal hemp, flax, common hemp, cotton and jute are the fibres commonly used. Sisal is preferred for certain uses, and because of its price and because of special demand in certain markets in which it is to be sold. For other uses it is not so good and is displaced by other fibres.

All the fibre produced is not exported from Mexico, but a very large part is retained for home-consumption, being made into a great variety of articles which are in everyday use in all parts of the country. Twines, ropes, matting, bagging, hammocks, sandals,<sup>1</sup> harness, baskets and ornaments are the principal articles made in Mexico from sisal. Rarely are any of these articles sent to the United States except as curios.

Tampico hemp, so named because it is exported from the port of Tampico in the State of Tamaulipas on the Gulf Coast, is a shorter stiffer fibre obtained from another species of century plant. San Luis Potosi is the centre of the district in which this fibre is grown.

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<sup>1</sup> "Shoes in Mexico are a foreign innovation, and properly form no part of the national costume. The great majority of the people do not wear shoes at all, and probably never will; but in their place use sandals, composed of a sole of leather rawhide, or plaited fibres of the magney plant, fastened to the foot with strings of the same material, as the only protection for the foot needed in their warm, dry climate. And these sandals are so easily made and repaired that every Mexican peasant, no matter what may be his other occupation, is always his own shoemaker. As a general rule, also, the infantry regiments of Mexico wear sandals in preference to shoes; 'not solely for the sake of economy, but because they are considered healthier, keep the feet in better condition, and are more easily repaired or replaced, and make the marching easier.' Very curiously the pegged shoes of the United States and other countries are not made and cannot be sold in Mexico, as, owing to the extreme dryness of the atmosphere, the wood shrinks to such a degree that the pegs speedily become loose and fall out."—"A Study of Mexico," by David A. Wells. D. Appleton & Co., New York, 1887.

The same name is given also to a fibre from a species of yucca. Tampico hemp is used for making brushes of various kinds, and for door-mats.

#### PULQUE, THE NATIONAL DRINK.

Several species are important because of their sap, which is used for making pulque, mezcal and some other liquors of less importance. These plants are known as the pulque agaves (pronounced pool'ka) and mezcal agaves. The common century plant of our greenhouses is one of the most important of the pulque agaves.

The pulque agaves are cultivated on the plateaus and in nearly all parts of the mountainous districts at from 6,000 to 8,000 feet above sea-level, but the vicinity of the City of Mexico is the great centre of the pulque industry. For a distance of about sixty miles on all sides of the capital city there are immense pulque plantations, many of them containing thousands of acres of land. Many small farms also are wholly or partially devoted to raising the pulque agave; and many families who do not make a business of growing the plant keep a few growing in their door-yards from which to obtain their own supply of pulque.

The pulque agaves are cultivated in the same manner as the sisal agaves. When ready to bloom the plant produces large quantities of sap which, under ordinary conditions, would go to form the tall stout flower-pole and flowers. But the "pulquero," *i.e.*, the sap-gatherer, cuts out the bud and the rosette of leaves in which it nestles and scoops out a hollow in the top of the plant. Into this hollow a great amount of sweet greenish, yellowish or whitish juice exudes. This juice is called *aguamiel*, meaning honey water, and is much liked. The flow continues for three or four months, some plants yielding as much as 2 gallons per day. The pulquero-visits each plant at least twice a day to collect the sap. The sap is drawn by suction into a long gourd and is then emptied into a pigskin bag carried on the back of the pulquero or on the back of a burro. Each day the sides of the hollow in which the sap is collected are scraped in order to permit free exudation. But small quantities of *aguamiel* are consumed, because it so rapidly ferments that transportation to the cities is almost impossible. When fermented it is called pulque. The usual method of fermenting is to add an equal amount of milk and a small quantity of rennet; pour the mixture into vats made of



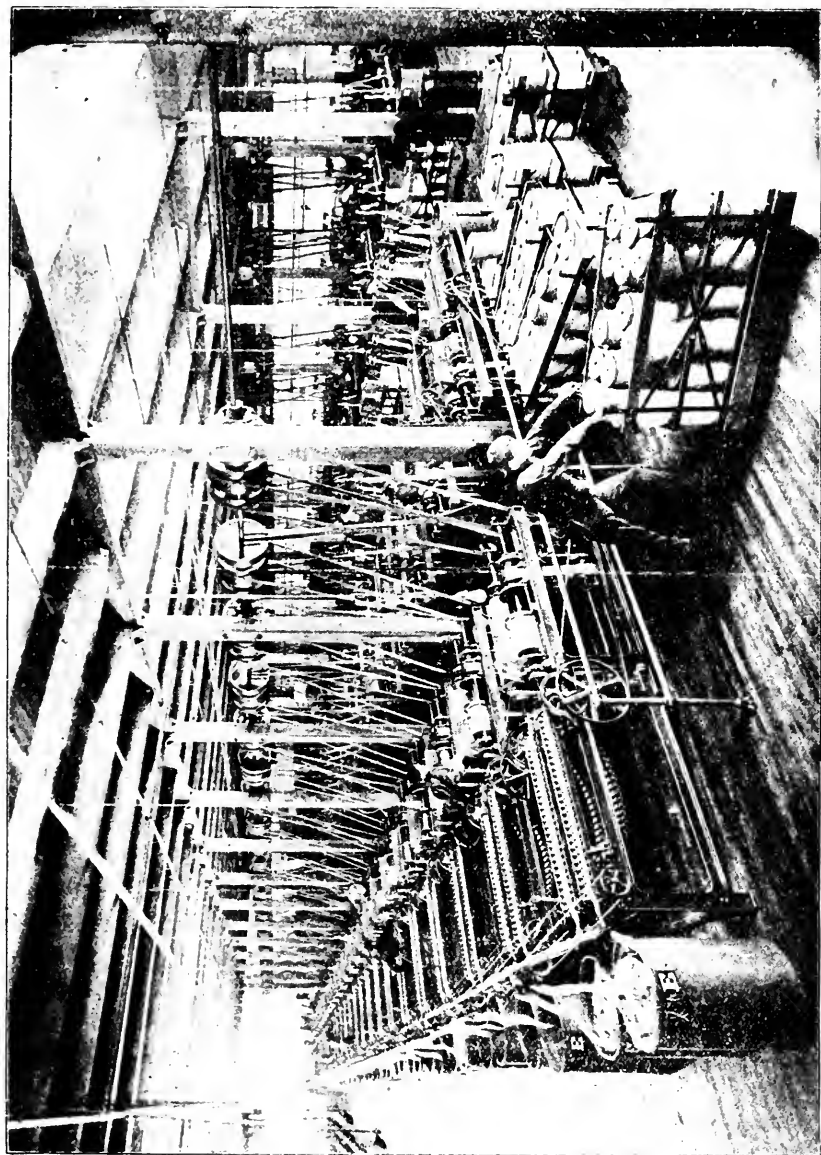


FIG. 5.—One of the five spinning-rooms in the great McCormick Twine Mills.

raw cowskins and allow it to stand about thirty-six hours. It curdles somewhat and resembles thin buttermilk, has an unpleasant odor like partially decayed meat or rancid cheese and tastes like stale buttermilk. Persons unaccustomed to its use find it at first disgusting and nauseating, but soon acquire a taste for it and find it palatable and refreshing. Taken in large quantities it is intoxicating. It contains about 7 per cent. alcohol.

Pulque is the national drink of the Mexicans, just as beer is the national drink of the Germans, or as wine is the national drink of the French. Large areas of land and many thousands of laborers are devoted to its production. The railroads of the pulque district run daily pulque trains to the City of Mexico, and to other parts of the country, and large quantities are carried on the backs of burros into the capital and other cities in the pulque district. The City of Mexico has about 1,000 "pulquerias" or "cantinas," *i.e.*, saloons, in which nothing but pulque is sold. The daily consumption in that city exceeds 50,000 pints.

Another product of agave is mezcal, a clear, strongly alcoholic liquor made by distilling the sap of various species of agave. The pulque agaves may be used for the purpose, but most of the mezcal is distilled from the juice of other species which are called mezcal agaves or mezcal magueys. These plants have thinner and narrower leaves than the pulque agaves. Mezcal is called also *mexcal*, *aguardiente de maguey*, and *tequila*. In English it is often called Mexican brandy. Its taste resembles that of strong rum. It is extremely intoxicating and brutalizing. Large quantities are consumed throughout Mexico, and it is one of the national drinks. The entire product of pulque and mezcal is consumed in Mexico.

Vinegar is made by rapidly fermenting the sap. When completely evaporated the sap yields sugar; partially evaporated it yields a sweet, honey-like syrup.

The pulque and mezcal agaves yield fibre similar but much inferior to that of the sisal agaves. The plants are grown almost exclusively for the sap products. What fibre is extracted is used locally.

#### A WIDE VARIETY OF PRODUCTS.

The fibre and the sap are the most important products of these plants, and it is for these that they are cultivated. But there are many

other uses for which the plant itself and its products, and the by-products and wastes of the fibre-extracting mills are adapted. The waste fibre of the mills is used for oakum and as packing material, and can be used for making coarse paper. A handful of the waste serves as a toilet sponge and is quite commonly used in this way. The sharp spine at the tip of the leaf is often used as a nail. With a strand of fibre left attached to it, it serves as a threaded needle and is much used for sewing up bagging, repairing harness, sandals, etc. The flower-stalks are used for fishing poles, lance-handles, razor strops, and for constructing the walls of huts. The leaves are used as fodder and to thatch huts. The roots and leaves of several species, especially *Agave saponaria*, are used as soap substitutes.

The plants are much used in Mexico for hedges, and in many parts of the world in ornamental gardening.

#### STATISTICS OF OUR IMPORTS.

During the year ending June 30, 1900, the principal fibres imported into the United States were valued at \$26,373,805, which was distributed among the various fibres, as shown in the following table:

##### U. S. IMPORTATIONS OF FIBRE FOR THE YEAR ENDING JUNE 30, 1900.

	Tons.	Dollars.
Sisal . . . . .	76,921	11,782,263
Manila . . . . .	42,624	7,172,368
Jute and jute butts . . . . .	102,694	3,956,413
Flax . . . . .	6,967	1,646,274
Istle or Tampico . . . . .	5,748	475,090
Hemp . . . . .	3,400	450,269
All other . . . . .	10,953	891,128
	249,307	26,373,805

**THE PRESCOTT PORTRAIT.**—A life-size oil portrait of Dr. Albert B. Prescott was presented to the University of Michigan by the alumni of the School of Pharmacy on June 18th. Dr. A. B. Lyons was chairman of the meeting, and Mr. A. L. Parker formally presented the portrait to the University. President James B. Angell, responding on behalf of the University, alluded to Dr. Prescott's long connection with it, and said that the University Faculties looked forward to the day when a great chemical laboratory should replace the present one—one worthy of the University and worthy to bear the name of the Prescott Laboratory. Dr. Edward Kremers, of Madison, Wis., delivered an address on "The State University and Pharmaceutical Education." An informal reception at the residence of Prof. A. B. Stevens concluded the exercises.

LEGISLATION AND JUDICIAL DECISIONS OF INTEREST  
TO PHARMACISTS FOR THE YEAR 1901-1902.

BY J. H. BEAL.

## LEGISLATION.

The winter has been noteworthy for the fact that fewer measures than common have been introduced either by pharmacists or aimed at them by antagonistic interests. In several States bills have been introduced proposing to register physicians as pharmacists without examination, and also to admit to the register persons who have had a certain number of years' experience. So far as we have been able to learn, all such measures have been defeated.

In at least three States, and possibly in others, attempts were made to pass laws prohibiting the charging of soda fountains in buildings used for any other purpose. These measures were pushed by the bottling interests, and would have absolutely prevented the charging by druggists of their own fountains. Fortunately for the drug trade, the bills were all defeated, and a similar law passed in New York two years ago was repealed.

Like measures will doubtless appear in the future, and it behooves pharmacists to be on the alert while the general assemblies are in session.

Ohio now has a brand-new poison law, based principally upon the poison section of the A.Ph.A. model, a copy of which is printed below, and although it does not go into effect until January, 1903, its effect is seen in the fact that a number of country grocers have already thrown out their stock of drugs, with the statement that if they must register the sale of every poison they won't handle such articles at all. Thus the public will receive a better measure of protection, while the pharmacist will come into his own again.

## OHIO POISON LAW.

Replacing the former Poison Law, the Poison-Label Law and the Morphine Law.

SECTION I. It shall be unlawful for any person to knowingly sell or deliver to any minor under sixteen years of age, except upon the written order of an adult, or to sell or deliver to any person, any of the following described substances, or any poisonous compound, poisonous combination or poisonous preparation thereof, to wit: The compounds and salts of antimony, arsenic, chromium,

copper, lead, mercury, zinc, the concentrated mineral acids, oxalic and hydrocyanic acids and their salts, yellow phosphorus, carbolic acid, the essential oils of almonds, pennyroyal, tansy and savin, croton oil, creosote, chloroform, chloral hydrate, cantharides, or any aconite, belladonna, bitter almonds, colchicum, cotton root, cocculus indicus, conium, cannabis indica, digitalis, hyoscyamus, ignatia, lobelia, nux vomica, opium, physostigma, phytolacca, strophanthus, stramonium, veratrum viride, or any of the poisonous alkaloids or alkaloidal salts or other poisonous principles derived from the foregoing, or any other poisonous alkaloids or their salts or any other virulent poison, except in the manner following :

It shall first be learned by due inquiry that the person to whom delivery is made is aware of the poisonous character of the substance, and that it is desired for a lawful purpose, and the box, bottle or other package shall be plainly labeled with the name of the substance, the word "poison," and the names of two or more substances which may be used as antidotes. And before delivery shall be made of any of the foregoing substances, there shall be recorded in a book kept for that purpose the name of the article, the quantity delivered, the purpose for which it is alleged to be used, the date of delivery, the name and address of the purchaser, and the name of the dispenser, which book shall be preserved for at least five years, and shall at all times be open to inspection by the proper officers of the law.

SEC. 2. The provisions of Section 1 of this act shall not apply to articles dispensed to or upon the order or prescription of persons believed by the dispenser to be lawfully authorized practitioners of medicine or dentistry, and the record of sale and delivery above mentioned shall not be required of manufacturers and wholesalers who shall sell any of the foregoing substances at wholesale, but the box, bottle or other package containing such substance, when sold at wholesale, shall be properly labeled with the name of the substance, the word "poison," and the name and address of the manufacturer or wholesaler ; nor shall it be necessary to place a poison label upon, nor to record the delivery of sulfid of antimony, or the oxid or carbonate of zinc, or of colors ground in oil and intended for use as paints, or calomel, paregoric, or other preparations of opium containing less than 2 grains of opium to the fluid ounce, nor in the case of preparations containing any of the substances

named in Section 1 of this act when a single box, bottle or other package, or when the bulk of  $\frac{1}{2}$  fluid ounce or the weight of  $\frac{1}{2}$  avoirdupois ounce does not contain more than an adult medicinal dose of such poisonous substance; nor in case of preparations recommended in good faith for diarrhœa and cholera, when each bottle or package is accompanied by specific directions for use and a caution against habitual use; nor in the case of liniments and ointments when plainly labeled "for external use only;" nor in the case of preparations put up and sold in the form of pills, tablets or lozenges and intended for internal use, where the dose recommended does not contain more than one-fourth of an adult medicinal dose of such poisonous substance.

SEC. 3. It shall be unlawful for any person to dispense, sell or deliver to any person, any salts of cocaine, morphine or its salts, or any of the alkaloids or salts of alkaloids of opium, except upon the written prescription of a legally qualified physician or dentist, such prescription not to be refilled, except upon the written order of the person prescribing the same; except, however, that sulphate of morphine may be sold by a registered pharmacist or assistant pharmacist in original packages containing not less than  $\frac{1}{8}$  ounce when registered in accordance with the provisions of Section 1 of this act.

SEC. 4. The penalty for the violation of any of the provisions of any section of this act shall not be less than ten dollars nor more than fifty dollars for each separate offense.

SEC. 5. Section 4238-27, Section 4364-54 and Section 6957 of the Revised Statutes of the State of Ohio are hereby repealed.

SEC. 6. This act shall take effect and be in force from and after the first day of January, A.D. 1903.

The legislature of Ohio also enacted a law prohibiting the promiscuous distribution of samples of pills and other potent medicines, and an anti-cocaine law, prohibiting the sale of cocaine, except upon physician's prescription.

Perhaps the measure which gave the most joy to Ohio druggists, however, was the law repealing the infamous Middleton Act. This was an act which slipped through the general assembly two years ago without its true intent being known. It gave any one the right to bring an action against any druggist for violating the Dow Liquor Tax Law. Under it a spy would obtain liquor from a drug-

gist by false pretense, and then threaten prosecution unless paid a certain amount of hush-money. Most druggists would settle rather than submit to the scandal and expense of a prosecution, and as a consequence the professional spies and informers waxed opulent during the two years of its existence.

In New York the pharmacy law has been again amended, so as to increase the number of societies which may take part in the election of members of the Board of Pharmacy.

Maryland, after a contest extending over fifteen years, has at last enacted an all-State law, which is printed below. While it may be considered as a long step in the right direction, the exceptions in Sections 14a, 15½ and 16 largely nullify the good effect which it would otherwise have.

#### MARYLAND PHARMACY LAW.

SECTION 2. *And be it further enacted*, That no person on or after the first day of July, following the passage of this act, shall open, conduct or keep a pharmacy in this State, either as a principal or agent, unless such person shall have obtained a pharmacist's certificate, as hereinafter provided, and no pharmacy shall at any time be left in charge of any person who is not a certified pharmacist, a certified acting pharmacist or a certified assistant pharmacist, to compound prescriptions or sell or dispense poisonous drugs. It shall, however, be lawful for physicians and dentists to compound and dispense their own prescriptions; but unlawful for any person, dealer or firm, not a certified pharmacist, a certified acting pharmacist or certified assistant pharmacist, to compound a physician's prescription. Any person violating this section shall, upon conviction, be deemed guilty of a misdemeanor, and fined not more than one hundred dollars for each offense.

SEC. 3. *And be it further enacted*, That every store or shop where drugs, medicines or chemicals are sold at retail, displayed for sale at retail, where physicians' prescriptions are compounded, which has upon it or in it as a sign the words "pharmacist," "pharmacy," "apothecary," "drug store," "druggist," or any of these words or exhibits, the characteristic show bottles or globes filled with colored liquids, shall be considered a pharmacy within the meaning of this act.

SEC. 4. *And be it further enacted*, That on or before the first day of May, following the passage of this act, the Governor shall

appoint five persons who are skilled and competent pharmacists, who have had ten years' active pharmaceutical experience, are actively engaged in the retail drug business and not connected with any school of pharmacy or medicine either as teachers, instructors or members of the board of trustees, to be Commissioners of Pharmacy, two of whom shall be residents of the city of Baltimore, and three residents of the counties of the State. Said commissioners shall constitute the Maryland Board of Pharmacy, and shall hold office as follows: One to serve five years, one four years, one three years, one two years, and one one year from the first of May next; in the first instance the Governor to designate in the appointment who to serve one, two, three, four and five years, and thereafter annually the Governor shall appoint one person to serve as a member of said board for the term of five years. The said commissioners shall, within ten days after notification of their appointment, each subscribe to an oath before the clerk of the Superior Court of Baltimore City, or the clerk of the Circuit Court of any county, to impartially and faithfully discharge the duties prescribed by this act. The position of any commissioner appointed under this act, who shall fail to qualify within the time and in the manner hereinbefore named shall be deemed vacant. The Governor shall fill all occurring vacancies from such sections of the State as will cause the board to be constituted as hereinbefore provided.

SEC. 5. *And be it further enacted*, That the said board shall organize by the election of a president, secretary and treasurer, who shall serve for the term of one year, and who shall perform the duties prescribed by the board. Meetings for the examination of applicants for registration shall be held on the first Thursday in April and October in each year, in the city of Baltimore, or at such times and places as may be fixed upon by the board; provided that ten days' public notice of the hour and place of each meeting at which there is an examination of candidates for registration shall be given. It shall be the duty of the board to receive all applications for examination and registration submitted in proper form; to grant certificates to such persons as may be entitled to the same under this act; to report annually to the Governor upon the condition of pharmacy of the State, which report shall also furnish a record of the proceedings of the board, as well as the names of all persons registered under this act; to keep a book in which shall be reg-



istered the names and places of business of all persons registered under this act, and all facts pertaining to the granting of certificates. The said board shall have the power to adopt any rules and by-laws not inconsistent with this act, necessary to the transaction of the business of this board; to demand and receive from applicants the fees herein provided, which shall by the treasurer of the board be paid to the treasurer of the State.

SEC. 6. *And be it further enacted*, That the salaries of said board shall be fifty dollars per annum to each member, and all legitimate expenses incurred in the discharge of official duties. The secretary of said board shall receive an additional salary to be fixed by the board, and not to exceed two hundred dollars per annum; he shall pay to the treasurer at each meeting, or whenever the board may direct, such funds of the board as may be in his possession, and take the treasurer's receipt therefor. In its annual report to the Governor, the board shall render an account of all moneys received and expenses incurred pursuant to this act, and the secretary and treasurer shall give such bond as the board shall from time to time direct.

SEC. 7. *And be it further enacted*, That any person who is at the passage of this act registered or entitled to registration in Baltimore City as managing owner, managing assistant or relief clerk, and shall, on or before the first day of July next following the passage of this act, pay to the Maryland Board of Pharmacy a fee of one dollar, shall be entitled to registration as pharmacist and receive a certificate of such registration.

SEC. 8. *And be it further enacted*, That any person who, at the passage of this act, is actively engaged as owner or manager, or is and has been so engaged as clerk for five years or more, and has reached the age of twenty-one years, in compounding drugs and dispensing physicians' prescriptions in one of the counties of this State, and who shall, on or before the first day of July next following the passage of this act, forward to the Maryland Board of Pharmacy an affidavit to that effect, together with a fee of one dollar, shall be entitled to registration as pharmacist and to a certificate of such registration.

SEC. 9. *And be it further enacted*, That on and after the passage of this act, any person who has had four years' continuous active experience in a pharmacy where physicians' prescriptions are daily

compounded, and has reached the age of twenty-one years, who, after examination by the Maryland Board of Pharmacy, shall be by it deemed competent, shall be registered as pharmacist and be given a certificate of such registration. Such person shall make application to the secretary ten days before any of the meetings of the board, and shall pay to the board a fee of five dollars.

SEC. 10. *And be it further enacted*, That any person over the age of eighteen who, at the passage of this act, is employed as a clerk or assistant in a pharmacy in this State, and has been actively engaged for one year in a pharmacy where physicians' prescriptions are daily compounded, and shall, on or before the first day of July next following the passage of this act, forward to the Maryland Board of Pharmacy an affidavit to that effect, together with a fee of fifty cents, shall be entitled to registration as assistant pharmacist and a certificate of such registration.

SEC. 11. *And be it further enacted*, That any person who has had two years of continuous active experience in a pharmacy where physicians' prescriptions are daily compounded, and has attained the age of eighteen years, who, after examination by the Maryland Board of Pharmacy, shall by it be deemed competent, shall be registered as assistant pharmacist and be given a certificate of such registration. Such persons shall make application to the secretary of the board ten days before any of its stated meetings, and pay to the board a fee of three dollars.

SEC. 12. *And be it further enacted*, That every applicant for examination shall, with his application to the secretary of the board, file a written declaration, duly sworn to before a justice of the peace or notary public, stating the pharmacy or pharmacies in which he has had the experience demanded in Sections 9 and 11. Any one swearing falsely in the affidavit so filed shall be deemed guilty of perjury.

SEC. 13. Every person receiving a pharmacist's or assistant pharmacist's certificate shall keep the same conspicuously posted in his place of business.

SEC. 14. *And be it further enacted*, That any certificate obtained by false representation shall be void, and the offender shall be fined not more than fifty dollars, or imprisonment for thirty days, or both, in the discretion of the court.

SEC. 14A. *And be it further enacted*, That nothing in this act shall

prevent regularly licensed physicians of the State of Maryland from selling and compounding drugs and medicines as a pharmacist.

SEC. 15. *And be it further enacted*, That all acts or parts of acts pertaining to the practice of pharmacy in the State of Maryland, in so far as they conflict with this act, are hereby void.

SEC. 15 1/2. *And be it enacted*, That the provisions of this act shall not apply to Talbot County.

SEC. 16. Provided, however, that nothing in this act shall be construed as preventing general merchants of the counties of the State or of Baltimore City from selling such drugs and medicines as have heretofore been handled by the general merchants of the State of Maryland, or any registered physician of this State from personally compounding and dispensing drugs and medicines.

The enactment of the Maryland law now leaves Idaho the only State in the Union without a pharmacy law.

Massachusetts druggists are rejoicing in the fact that the "Blue Laws" prohibiting the sale on Sunday of candy, cigars and soda-water were repealed at the last session of the State law-making body. Their repeal illustrates anew the fact that the druggists of a State are powerful enough to compel or prevent almost any kind of legislation when they work earnestly and harmoniously.

The preceding acts are the more important of the year's grist of legislation affecting pharmacy. Some minor changes and attempted changes have been reported from other States, but the writer has not yet been able to procure definite information concerning them.

#### JUDICIAL DECISIONS.

An interesting decision has been had in Iowa upon the responsibility of a vendor for injury caused by dangerous articles sold without giving notice of their dangerous qualities.

In this case (the Torbet case) the plaintiff called for phosphorus, which he received, properly labeled, but being injured because of his ignorance of the properties of the stuff, brought suit on the ground that the druggist was negligent in not giving notice of the dangerous qualities of the article supplied. The court says: "When a person who has reached the age of discretion, and who is apparently in the possession of his mental faculties, applies to a druggist for a certain drug, he represents to the dealer by implication at least that he knows its properties and uses and that he is a fit person to

whom sale thereof may be made, and that unless there is something connected with the transaction or something previously known to the seller, indicating that the would-be purchaser cannot safely be entrusted with the substance, a sale of the substance called for may be made without explaining its properties or the manner in which it may be safely used or handled."

This decision apparently overthrows the doctrine laid down in the case of *Wellington vs. Downer* (104 Mass., 67), where the court says: "It is well settled that a man who delivers an article which he knows to be dangerous or noxious, without notice of its dangerous qualities, is liable for any injury which may reasonably be contemplated as likely to result therefrom to that person or any other who is not himself in fault."

This was a case where naphtha was sold to a person ignorant of its nature, and who was injured by an explosion. The injured person was held entitled to recover damages.

A decision by the Kentucky Court of Appeals is of interest in that it decides that the prerogatives of a physician give him no right to sell drugs indiscriminately. The court says that a physician "cannot sell indiscriminately to persons calling for prescriptions, nor compound drugs and sell them indiscriminately to all who may call for them."

This seems just doctrine, and it is to be hoped that it will be followed by other courts which may have to pronounce upon such cases.

Much has been said of several decisions in cases brought by the Phenyo-Caffeine Company to prevent the sale of their goods at cut prices, and of the effect which these decisions will have upon the so-called Worcester Plan, made famous by the decision in the case of *Garst vs. Harris*, decided in Massachusetts about a year ago. So far as we can determine from the published accounts, these cases do not in the least infringe upon the integrity of the doctrine laid down in *Garst vs. Harris*. The latter case established the doctrine that a vendor may lawfully contract with his vendee that the latter shall not sell the articles bought under the contract below a certain price. This was a marked departure from the old common-law rule that all contracts restricting prices were against public policy and void, and the decision was justly hailed as a great step in the direction of price-protection. The later decisions referred

to do not contravene this doctrine in the least, but hold—and no doubt justly—that a mere purchase of goods marked to be sold at a certain price only is not sufficient evidence of the assent of the vendee to the terms printed on the wrapper.

In other words, the late cases merely affirm the good old rule that a man cannot be held for a breach of contract unless it can first be proved that he expressly or impliedly assented to the terms of the contract.

The N.A.R.D. plan has received a setback in the decision of the Georgia Supreme Court in the Jacobs conspiracy case. This was a suit brought by Joseph Jacobs, of Atlanta, against the local association for conspiracy to prevent him from obtaining goods from jobbers. The court in its decision affirms the old common-law doctrine that any combination to maintain prices is illegal, and that contracts designed to make such combinations effective are void, as against public policy.

The general tendency of courts, however, as shown by the case of *Garst vs. Harris* mentioned above and other cases, is to relax the strictness of the common-law doctrine of contracts in restraint of trade, and it is hardly probable that the Georgia decision will be universally followed.

In addition to the cases above mentioned, several others of interest are pending in several States and will receive mention when decided.

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## THE STERILIZATION OF SOLUTION OF MAGNESIUM CITRATE.<sup>1</sup>

BY HERBERT J. WATSON.

This solution should have first place among those which are entitled to rank among the preparations of elegant pharmacy. With the proper manipulations, in which a complete destruction of the deleterious microscopic organisms is affected, this solution may have this position.

Some contend that the use of heat injures the flavor, but this contention is not founded on any statements that have been published, so far as the author is aware.

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<sup>1</sup> Read at the Delaware Pharmaceutical Society, June 5, 1902, and communicated by the author.

The solution of magnesium citrate is a favorable medium for the development of these micro-organisms, and while its preparation has caused a very wide diversity of opinion among pharmaceutical writers, still some appear to have pursued rational methods of preparation. Some suggest the boiling of the water before adding to the syrup and magnesia solution, stating that it will thus keep indefinitely. Fifteen minutes' boiling for three successive days would be required for this method, the entire solution being used. Others suggest placing the filled bottles into a pan of boiling water for half an hour. This method would be effective if the bottles were placed in an Arnold sterilizer for three consecutive days, fifteen minutes each. Samples sterilized by this method in our laboratory, with an Arnold form, kept for three months without the formation of the slightest sediment. Another method, without the aid of sterilization, is to place the syrup in the bottles, then the solution of magnesium carbonate, water next, the crystals of potassium bicarbonate being the last addition. Stopper and set aside without the slightest agitation. The sediment in this solution appeared a few days later than in the pharmacopœial solution.

Experiments showed that the micro-organisms appear in three to five days in the official preparation. Samples made from tap and distilled water, with varying amounts of syrup of citric acid, required the same number of days' incubation at room temperature.

As a result of his experiments the writer proposes a method as follows: "Place the filtered magnesium citrate solution in bottles with the syrup of citric acid and distilled water, then small plugs of cotton between the rubber stopper and neck of the bottle and sterilize for three days, fifteen minutes each day. The autoclav, or the pressure sterilizer, requires but twenty-five minutes 110° C. under 6 pounds pressure.

Take small vials, 2 drachms each, add 35 grains potassium bicarbonate, plug with cotton, and place in a dry oven or sterilizer for one hour at 150° C. or 302° F. When the bottles containing the solution and salt are cool enough, carefully remove cotton from each, adding the contents of the vial to the syrupy solution, stopper tightly and dispense as needed. The solution thus prepared is a stable and pleasant cathartic, a sweet, aromatic, effervescing and carbonated beverage, and yields a profit of 65 per cent.

The organisms predominating in the different specimens ex-

aminated were represented in the molds, yeasts, and bacteria. *Penicillium glaucum* was the mold found, *Saccharomyces ellipsoideus* the yeast, and the bacteria were indefinite.

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## BLOOD EXAMINATION AS AN AID TO THE GENERAL PRACTITIONER.<sup>1</sup>

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BY WARREN S. SIMMONS, M.D.

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Read before the Medical Society of the County of Kings, November 19, 1901.

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In calling attention to the value of the examination of the blood in our everyday work, it is impossible to give an exhaustive account of the many departures from normal that are found in this fluid.

At the present time the various medical journals contain many articles on this important subject, although the majority of them are practically confined to discussing its relation to surgical disease, and completely ignore the fact that there are other conditions where the blood examination furnishes us with a very exact knowledge of the patient's condition, or at least gives us certain clues that are of inestimable value in establishing a diagnosis and applying proper treatment.

As regards the value of a blood examination, the profession at large appears to be divided into four important groups.

First, there are those who have made their diagnoses and instituted successful treatment before this subject was given the attention and prominence which it now occupies, and, considering their past successes, believe that it is of no value, or at least an added trouble, and deem themselves capable of treating their cases as well at the present time without its aid as they have done in the past.

A second class have confined their diagnoses almost entirely to the knowledge which is furnished by the condition of the blood, and in their enthusiasm for this one condition have completely lost sight of other symptoms which would act as a check upon mistaken premises.

There is still another group, men who, by the records and papers of the enthusiasts, have been led to believe that the knowledge thus

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<sup>1</sup> Reprinted from the *Brooklyn Medical Journal*, 1902, p. 17.

gained is of more importance and value than is seemingly the case. Having laid too much stress upon this point, they have been mistaken in their deductions and have often found conditions opposite to those one would naturally expect, and in their disappointment have rejected it.

The fourth and last class are those who I think rightly estimate this clinical phenomenon, and attribute to it in the majority of instances its true value as being one symptom that goes to make up the completed whole, weighing it carefully as regards the other findings in each individual case and giving to it only the consideration which is given to any other one fact.

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Normal human blood consists of plasma, red and white cells, blood plates and blood dust.

The red cells or erythrocytes are bi-concave discs and contain no nucleus. They are derived in extra-uterine life practically almost entirely from the red bone-marrow. In the early and late stages of the fetus, however, they are found developing respectively in the newly forming capillaries, the liver and spleen. The number of erythrocytes averages about 5,000,000 per c.mm. in men and a slightly less number are found in the blood of women. Their principal constituent is hemoglobin. In diseased conditions the erythrocytes may be altered in shape, size, number, percentage of hemoglobin and the appearance in the blood of nucleated corpuscles (normoblasts and megaloblasts), or the cells themselves may contain micro-organisms.

The white cells or leucocytes are colorless, nucleated bodies. They are derived from the lymph nodes, spleen and marrow. Their number is variously estimated from 5,000 to 10,000 per c.mm., the average of 16 independent observers being about 7,900. These cells are divided into groups and named in accordance with their size, shape of nucleus and reactions to acid, basic and neutral stains. The principal varieties are lymphocytes, large mononuclear leucocytes, polynuclear leucocytes and eosinophile leucocytes; and are also classed as basophile cells, neutrophile cells and eosinophile cells.

The basophile cells are the lymphocytes and the large mononuclear leucocytes. The neutrophile cells are the polynuclear leucocytes. The eosinophile cells are the so-called eosinophile leucocytes.



By a combination of these terms we arrive at those which are commonly used in expressing pathological findings. In diseased conditions, besides their increase in number, either relative or absolute, myelocytes also appear.

The proportion of the various leucocytes, according to Ehrlich's figures, are: Lymphocytes, 22, 25 per cent.; large mononuclear and transitional leucocytes, 2, 4 per cent.; polynuclear neutrophile leucocytes, 70, 75 per cent., and eosinophile leucocytes, 2, 4 per cent.

The blood plates are considered to be the extruded nuclei of the red blood cells, and for our purpose have no pathological significance; neither has the blood dust.

The technique of a blood examination is distinctly in the realm of the specialist in pathology, and to him should be intrusted the responsibility of this important procedure. I wish to emphasize markedly that he alone is the person to perform this work, for I truly believe that the blood examination as conducted by the average practitioner will be of no value whatever. Certainly there are not more than 25 physicians in Brooklyn who can perform this task satisfactorily and upon whose pathological report any reliance can be placed.

Such an examination should be conducted by men who possess the necessary knowledge, exact methods, special laboratory facilities, and above all, a skill in their work that only comes from an extensive experience, for certainly no good would accrue to our patients if we were to mistake small particles of dirt for malarial organisms, and in choosing a wrong time for a blood examination, report to the surgeon a marked leucocytosis, which is only the normal result of digestion.

I would add, too, that it is much better for the pathologist to secure the specimen himself, and also that he be instructed upon just what particular points information is desired; whether the number of cells—red or white—the percentage of hemoglobin, the presence or absence of micro-organisms or certain serum reactions which are now obtained.

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The principal diseases in which we are aided in diagnosis by the changes in the red cells are the primary and secondary anemias.

In simple anemia or chlorosis the red cells are slightly decreased or increased in number and the hemoglobin is markedly decreased.

The color index is usually low. This color index is really an estimation of the amount of hemoglobin in each cell on a percentage basis, and is obtained by dividing the percentage of hemoglobin by the percentage of the red cells present, 5,000,000 of the erythrocytes being considered 100 per cent.

Therefore, given a case with 3,000,000 red cells and 50 per cent. of hemoglobin, the color index would be .83 (found by dividing 50 per cent. hemoglobin by 60 per cent. red cells present), the normal color index being represented by 1.

In pernicious anemia, the number of red cells is markedly reduced, even to 1,000,000 or less. They are altered in size, shape and appearance of nucleated forms, namely, megaloblasts, large nucleated red cells and normoblasts, or nucleated red cells of nearly normal size.

In the secondary anemias, namely, those following hemorrhages, acute or chronic infectious febrile diseases, malignant growths, some intestinal parasites, etc., the conditions of the red cells are identical with those found in simple and pernicious anemias, varying in degree according to the severity of these secondary causes.

An increase in the number of the white cells or leucocytosis is *normally* present in the newly born, during digestion, the latter part of pregnancy, after parturition, after violent exercise, massage, cold bathing and in the moribund state.

*Pathological leucocytoses* are post-hemorrhagic, inflammatory toxic, those found in malignant disease, and those due to therapeutic and experimental influence. According to Cabot we have the following subdivision:

Inflammatory.—(a) Infectious diseases with comparatively slight local inflammatory processes: Asiatic cholera, relapsing fever, yellow fever, typhus fever, scarlet fever, bubonic plague, erysipelas, secondary stage of syphilis, diphtheria and true follicular tonsillitis.

(b) Infectious diseases with more extensive local lesions: Pneumonia, smallpox, malignant endocarditis, trichinosis, glanders, actinomycosis, septicemia and all conditions that are the result of suppurative inflammation.

The febrile state of acute multiple neuritis: Acute articular rheumatism, cerebro-spinal meningitis, cholangitis, cholo-cystitis, empyema of gall-bladder, acute pancreatitis, endometritis, some cases of

cystitis and gonorrhea, serous and purulent non-tubercular inflammations, such as pericarditis, peritonitis, conjunctivitis, etc., gangrenous inflammations of the appendix, lungs, bowels, mouth, etc., and many inflammatory skin diseases.

The principal toxic leucocytoses are those found in illuminating gas poisoning, quinine poisoning, uric acid diathesis, rachitis, acute yellow atrophy of the liver, and those cases of hepatic cirrhosis associated with jaundice, acute gastrointestinal disorders, the uremic state of cases of chronic nephritis, after the injection of tuberculin and thyroid extract, after intravenous injection of normal saline solution, after ingestion of the salicylates.

In certain diseases leucocytosis is absent, namely, typhoid fever, malaria, most cases of gripe, measles, mumps, some cases of cystitis, tuberculosis, including milary tuberculosis and incipient phthisis and tubercular inflammations of the peritoneum, pericardium, the bones, periosteum and pleura.

A lymphocytosis is an increase in the number of lymphocytes in the blood; the remaining forms of the leucocytes may or may not be increased in this condition. Its principal diagnostic value lies in the fact that it is an aid to us in obscure syphilitic disease, and also it is a most important symptom in the lymphatic leukemia.

Micro-organisms are found in the blood in malaria, as the *Plasmodium malariae*; relapsing fever, its spirillum; elephantiasis, the *Filaria sanguinis hominis*; and septicemia, the pyogenic micrococci.

The so-called serum reactions are the phenomena observed when certain bacteria are brought in contact with the diluted serum of a patient suffering from the disease which they invariably cause. This reaction consists of a loss of their motility and the fact that they become clumped together in groups.

The most important diseases in which these reactions occur are: Typhoid fever (usually after the tenth day), accomplished by a dilution of serum in the strength of 1 in 30 or less.

Bubonic plague (in the second week) with a dilution of 1 in 10, and an increasing dilution as the disease goes on.

Relapsing fever and leprosy.

## RECENT LITERATURE RELATING TO PHARMACY.

## THE NATURE OF THE ENZYMES.

There appeared in the *Pharmaceutische Centralhalle*, for October, 1901, an article upon the nature of the enzymes, in which the author, Th. Bokorny, gives quite a comprehensive treatise, in a tabular form, of the most important of the enzymes, together with a short theoretical consideration as to their source and probable admixtures as contained in the protoplasm, together with methods for their extraction and effect upon their fermentative activity as produced by physical and chemical means.

The separation of the enzymes from their admixtures is very difficult, and in fact can rarely be accomplished without damage to or destruction of their fermentative power. As the protoplasms consist of nuclealbumins, the enzymes obtained from them are likewise nuclealbumins, because the splitting of albuminous material, carbohydrates, etc., is carried out by the protoplasmic material given off by the living protoplasm, and consequently, for fermentation, the direct contact of the living protoplasm is not necessary.

Halliburton and Pikelharing have confirmed the theory as regards the nuclealbuminous nature of some of the enzymes. J. R. Green accepts the same theory and practically demonstrates it in regard to the majority of the enzymes, in his book upon the subject.

"The agreement of enzymes with the protoplasm as regards ability of reaction toward outside influences, slight loss of enduring activity (degeneration), existence of an active, for a time inactive, enduring active condition, indicates, as the editor has shown further on, that it is about active albuminous material or about protoplasmic proteid."

In the following tables is seen the remarkable parallelisms that exist between the protoplasm and enzyme as regards their behavior toward light, temperature, desiccation, poison, etc. "How is this to be otherwise explained than by the acceptance that both consist of one and the same enigmatic material out of active protein?" The yeast contains in its protoplasm, according to the author, perhaps a dozen different plasmaproteids.

The name of the protoplasm or enzyme, together with the factors influencing its activity, might be given in the following form so as

to serve for a reference if needed when reading the table following :

*A.*—Name of the protoplasts or enzymes.

*B.*—The effect of light and temperature.

*C.*—Injury by means of desiccation and treatment with alcohol.

*D.*—Consequences of a separation from their natural admixtures.

*E.*—Acceleration by means of small additions of salts, acids, etc.

*F.*—Injury in general by means of powerful protoplasmic poisons.

*G.*—Effect of acids and alkalies.

*H.*—Effect of various antiseptics.

*A.*—**Bacteria and fungi protoplasm.**

*B.*—Nägeli found that bacillus subtilis could be boiled in water for eleven hours without notable injury. In a vegetative condition they are mostly killed by a temperature of 55°–60° C. Light also injures many bacteria (H. Büchner).

*C.*—As is known, spores withstand desiccation for a long time.

*D.*—Consumption of the reserve food makes the protoplasm more delicate.

*E.*—Small additions of phosphates, calcium salts, etc., act as nutrient, larger amounts (*e. g.*, 10 per cent.) are injurious and produce osmosis of the protoplasm. A feebly alkaline reaction is useful with bacteria, acid reaction with fungi.

*F.*—The bacilli of lactic acid are injured by 0.001 per cent. sodium fluoride (Effront); 1 per cent. of sodium fluoride absolutely kills putrefactive fungi. Mercuric chloride 0.1 per cent. is a sure disinfecting medium, kills immediately upon one application (R. Koch); 0.02 per cent. is usually sufficient. Formaldehyde kills all fungi in 0.1 per cent. strength, when it is allowed to act for one hour. Silver nitrate is not nearly so destructive as mercuric chloride.

*G.*—Fungi grew in acid up to 1 per cent. Most bacteria become sensitive when the smallest amount of acid is present; however, the bacillus of anthrax grew in a 1 per cent. solution of HCl for forty-eight hours. Bacteria grow in feebly alkaline solutions.

*H.*—With 0.002 per cent. (saturated solution) of oil of turpentine the formation of mould was prevented; putrefaction was only retarded. Carbolic acid 1:850 prevented the germination of anthrax spores (Koch) and meat-water bacteria (de la Croix). Carbolic acid 0.5 per cent. killed the anthrax bacilli; with an abundance of a 5 per cent. solution the spores were not entirely killed.

*A.*—**Protoplasm of yeast** (*Saccharomyces* and others con-

tained in the German yeast. The varieties grown considered by the author).

*B.*—Direct sunlight of long duration caused death.  $25^{\circ}$ – $30^{\circ}$  C. is the most favorable temperature for their development. Young vegetative yeast cells die at  $50^{\circ}$ – $60^{\circ}$  C., spores at  $60^{\circ}$ – $65^{\circ}$  C.; in a dry condition they will stand a maximum temperature of  $125^{\circ}$  C. (Kaiser).

*C.*—When dried they die, only the spores remaining alive.

*D.*—Consumption of the reserve food makes the protoplasm more delicate.

*E.*—Small additions of acid promote the development of yeast (*e. g.*, 0.002 per cent. sulphuric acid, M. Heyduck). Salts act as with bacteria and fungi.

*F.*—Budding yeast is a little more sensitive to sodium fluoride than bacteria; with 0.005 per cent. of sodium fluoride their fermentative activity was increased. Mercuric chloride 0.02 per cent. killed the yeast within twenty-four hours. Silver nitrate the same. Formaldehyde 0.1 per cent. killed within sixteen hours, 0.05 per cent. was very injurious.

*G.*—Beer yeast was not killed after remaining in 0.5 per cent. of sulphuric acid for sixteen hours, but the cream yeast was killed during this time of exposure. In 0.1 per cent. the beer yeast did not in the above time appear to have lost any of its generative power. Also injured in 0.5 per cent. of lactic acid; 0.5 per cent. of sodium hydrate is deadly within sixteen hours, 0.1 per cent. is not.

*H.*—Turpentine water (solution 1 : 75,000) destroyed the generative power within twenty-four hours. Thymol water (about 0.1 per cent.) killed the yeast within two hours. 1 per cent. of carbolic acid killed the pressed yeast within fourteen hours. Chloroform killed yeast; 10 per cent. alcohol was for a long time produced; 30 per cent. killed the pressed yeast within three weeks.

#### *A.*—**Protoplasm of the lower plants and animals.**

*B.*—Spirogyra was rapidly killed in water heated to  $45^{\circ}$ – $55^{\circ}$  C. Many species of algæ live in the Carlsbad thermal springs as well as the warm spring from Ischia with a temperature ranging from  $53^{\circ}$ – $85^{\circ}$  C. Sea-water animalculæ die at  $35^{\circ}$  C., fresh-water amœba at  $40^{\circ}$ – $45^{\circ}$  C. (Kühne). Too strong light is injurious.

*C.*—Spirogyra die in about twelve hours when in dry air (over sulphuric acid). Absolute alcohol kills immediately. Many lower

animals, as is well known, withstand the desiccation for a longer time.

*D.*—Through fourteen days of starving (in the dark), whereby the admixtures of the protoplasts are consumed, the spirogyra die (according to Loew and Bokorny, *Chem. Kraftquelle*, page 64). The protoplasm of spirogyra is very sensitive, due to the admixed lecithins.

*E.*—Sodium chloride acts upon the lower plants as before stated, calcium salts enhance the  $\text{CO}_2$  assimilation. Caffein 0.1 per cent. or less produced rapid movement of the paramœcium.

*F.*—Mercuric chloride 0.005 per cent. kills spirogyra, cladophora, paramœcium and vorticella within six hours and 0.002 per cent. within two days. Small animalculæ are killed within twenty-four hours by a 0.005 per cent. solution. Silver nitrate is more powerful; even a dilution of 0.0001 per cent. kills many individuals of the named animal and plant species within twenty-four hours. 0.1 per cent. sodium fluoride kills the various algæ within twenty-four hours. Formaldehyde 0.005 per cent. kills spirogyra within a few days.<sup>1</sup>

*G.*—0.1 per cent. acid kills spirogyra within thirty minutes; a 0.1 per cent. alkaline solution kills it within ten hours. Amœba are immediately killed by a 1.0 per cent. ammonia solution, but not by 0.02 per cent.; 0.013 per cent. of lime water kills spirogyra.

*H.*—Ether or chloroform vapor kills spirogyra in a very short time. Absolute alcohol kills it immediately, 20 per cent. of which kills in a very short time. In 0.1 per cent. copper sulphate solution, according to O. Loew, the algæ remain alive for a longer time.

*A.*—**Zymase** (the ferment of alcoholic fermentation discovered by E. Büchner).

*B.*—At 25° C. fermentation succeeds the best; at 53° C. it is destroyed; at 0° C. it is not harmed.

*C.*—A dried soft-pressed yeast loses its fermentative capacity in about three weeks (E. Büchner). Exhausted yeast, when treated with a large quantity of absolute alcohol has, after eight days, some fermentative capacity when the alcohol is removed.

*D.*—Pressed yeast, when dried at 25° C. and triturated, retained its fermentative power for eight weeks; dried soft-pressed yeast for only three weeks.

<sup>1</sup> For further information see Vol. 64 of this JOURNAL.

*E.*—Small additions of sodium fluoride act as a stimulus and intensify the fermentative activity.

*F.*—Mercuric chloride destroys in 0.02 per cent. amounts; silver nitrate 0.01 per cent. within twenty-four hours. Formaldehyde 0.2 per cent. is fatal within twenty-four hours. Sodium fluoride 1 per cent. is destructive, but 0.005 per cent. accelerates the action of the zymase.

*G.*—0.5 per cent. sulphuric acid destroys the zymase within twenty-four hours; 0.1 per cent. destroys it in five days, but not in twenty-four hours. 0.3 per cent. hydrochloric acid destroys in twenty-four hours. 1 per cent. acetic acid does not destroy in twenty-four hours, but in five days. 0.5 per cent. sodium hydrate injures in twenty-four hours, but does not entirely destroy.

*H.*—1 per cent. carbolic acid destroys in twenty-four hours; with 0.1 per cent. it does not. Water saturated with oil of turpentine destroys within twenty-four hours. 0.1 per cent. thymol also destroys within twenty-four hours. Chloroform does no injury within twenty-four hours. A small amount of copper sulphate has no injurious effect (Fiechter).

*A.*—**Maltose**, that is, glucose (in the yeast and other materials).

*B.*—Yeast maltose is destroyed by 50° C. (Lieber and Kröber). Corn maltose, according to Géduld, works best at 35° C.

*C.*—Yeast maltose does not stand desiccation.

*D.*—Injurious.

*E.*—0.02 per cent. sodium hydrate promotes the action of the yeast maltose.

*F.*—0.01 per cent. of silver nitrate or 0.02 per cent. mercuric chloride destroys in twenty-four hours. 0.1 per cent. formaldehyde injures in twenty-four hours; 1 per cent. destroys in twenty-four hours; 5 per cent. destroys in thirty minutes.

*G.*—1 per cent. sodium hydrate destroys the yeast maltose within eight hours; 0.1 per cent. or 0.02 per cent. has no injurious effect within twenty-four hours; 0.5 per cent. is not fatal within twenty-four hours; 0.02 per cent. even accelerates. 1 per cent. of hydrochloric or oxalic acid gradually destroys yeast maltose. 1 per cent. acetic acid does not entirely destroy it.

*H.*—1 per cent. carbolic acid destroys yeast maltose within twenty-four hours; 0.1 per cent. does not destroy it. Chloroform water does not destroy in twenty-four hours. Turpentine water



severely damages within twenty-four hours; 0.1 per cent. thymol destroys its fermentative power.

A.—**Yeast invertase** (invertin).

B.—With 70° C. moist heat it is rapidly destroyed; at 50° a longer time is required. It works best, according to A. Mayer, at 31° C.; according to Kjeldahl, at from 52°–56° C. (These statements certainly have reference to different invertases.)

C.—In entirely dried yeast there is still active invertin present. O'Sullivan and Thompson have prepared it from powdered beer yeast.

D.—The purer the invertase the more it is injured by alcohol (O'Sullivan and Thompson). And it is said to be easily dissolved out of the yeast by means of water. The invertase in cane-sugar solution can be heated 25° C. higher than the temperature at which it was destroyed in pure water (O'Sullivan and Thompson).

E.—The ammonia salts, even in higher concentration, accelerated the production. Very small additions of sulphuric acid act favorably (0.001 to 0.02 per cent., according to O'Sullivan and Thompson).

F.—0.1 per cent. mercuric chloride does not entirely impede the inversion of cane sugar, but 0.5 per cent. prevents it in two days. 0.02 per cent. silver nitrate does not impede it, but 0.1 per cent. prevents it entirely. 5 per cent. of formaldehyde does not destroy in twenty-four hours.

G.—1 per cent. sodium hydrate destroys the fermentative power in twenty-four hours; 0.5 per cent. does not destroy it even within four days. 0.5 per cent. sulphuric acid damages, but does not entirely destroy the fermentative power within twenty-four hours, hydrochloric acid acting the same. 1 per cent. oxalic acid does not perceptibly damage within twenty-four hours.

H.—1 per cent. carbolic acid does not damage within twenty-four hours; the same with 0.1 per cent. thymol. Borax damages. Even absolute alcohol does not destroy by an action of twenty days.

W. S. WEAKLEY.

#### THE VALUATION OF CORTEX GRANATI.

Stoeder (*Pharm. Weekblad.*, 1902, 21) gives the following method for the valuation of this bark: Twenty grammes of the dry powdered bark are shaken well with 100 c.c. of chloroform and 5 c.c.

of ammonia for twelve hours, when 20 c.c. of water is added and the whole allowed to separate. Seventy-five cubic centimeters of the chloroformic solution are filtered (=15 grammes bark) and from the filtrate about two-thirds of the chloroform are distilled off. The remainder is transferred into a separator, and the flask washed with 5 c.c. of chloroform, and the alkaloids are shaken out with dilute hydrochloric acid. They can now be estimated by weighing and by trituration. The mean molecular weight of the alkaloids is found to be 147.5.—*Chem. and Drug.*, May 17, 1902.

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## EDITORIAL.

### THE AMERICAN PHARMACEUTICAL ASSOCIATION.

The American Pharmaceutical Association enters upon the work connected with the celebration of its fiftieth anniversary with unusual enthusiasm upon the part of the members and with a more or less marked manifestation of interest by the pharmacists throughout this country. During the past year the pharmaceutical and drug journals have published numerous articles containing suggestions intended to benefit this association in adding to its membership and usefulness.

The presidents of the various state pharmaceutical associations are calling attention this year in their addresses to the coming jubilee meeting of this parent association. This is seed sown in places where it is likely to bear fruit.

Mr. Cliffe, President of the Pennsylvania Pharmaceutical Association, well said that, "At Philadelphia, commencing on September 8th next, there will be held the fiftieth anniversary of the American Pharmaceutical Association, the parent of all pharmaceutical bodies in the United States. If the aims and purposes of this organization could be reduced to a single phrase, it would probably be nearly correct to say that they were to make better pharmacists for pharmacy. For fifty years this association has gone steadily on in its allotted work, leaving in its trail only that which reflects honor, profit and glory on American pharmacy and American pharmacists participating in its deliberations. There is no entrance fee charged, and the yearly dues of \$5 are more than returned to its members through the publication of an annual report of its proceedings, which is a complete collation of the advances in phar-

maceutical knowledge for the year—a yearbook of pharmacy. It is a publication that any one practically interested in the application of scientific pharmaceutical knowledge to commercial purposes can appreciate at all times in the busy activities of his work.”

The special delegates appointed by the President of the A.Ph.A. to the various state pharmaceutical associations are also active in attesting to the value of membership in this association. The address of Mr. Ebert at the recent meeting of the Illinois Pharmaceutical Association illustrates the point we have in mind. He said, among other things, “The history of the American Pharmaceutical Association is the history of pharmacy in this country. With the advancing years it becomes necessary, in order to keep up the life and vigor of the association, constantly to infuse new blood, to gain new and younger members to carry on the necessary and vitally important work of the organization. Membership in the American Pharmaceutical Association is an honor to be coveted by every pharmacist who respects himself and his profession. By allying himself with the organization, he comes in touch with the brightest men in pharmacy and keeps himself abreast of the latest and best scientific thought in his profession. Aside from all this, the annual reports of the proceedings of the association form a library of invaluable information to every pharmacist, each volume of which will be worth to him many times the sum of \$5 he pays as the amount of his annual dues.

“During the many years of its useful life the association has met in nearly every city of prominence in America, and the social and entertainment features at each meeting are not the least of the many advantages which membership carries with it. Those who join the association and attend its annual conventions meet their brethren from various parts of the country, discuss questions of interest and combine business with pleasure on their annual vacations in a manner both pleasant and profitable, invigorating alike to the mind and the physique. We urge you to join and will welcome you as members, assuring you that, should it be possible for you to attend our meetings, you will find the outlay one that you will never regret.”

The Committee on Membership, as well as the President, are very active in their endeavors to increase the membership of the association. Mr. Lewis C. Hopp, Chairman of the Committee on Member-

ship, has offered a prize of a \$5 gold-piece to the druggist giving the best ten reasons why a druggist should be a member of the American Pharmaceutical Association.

The various other committees of the association are hard at work in their endeavors to make the Jubilee Meeting one of unusual interest and profit to all those interested in the professional as well as commercial welfare of pharmacy. In our next issue we hope to give some details of the plans that are being arranged. Suffice it for the present to say that all those attending the meeting will be given a most cordial reception, and that arrangements are being made for the most successful convention that the association has ever held.

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### PERSONAL NOTES.

PROF. S. P. SADTLER had conferred upon him, at the commencement of Gettysburg College, on June 18th, the degree of LL. D. *honoris causa*. He received the degree of A.B. from this College in 1867, and in 1870 he received B.S. from Harvard University, and in 1871 Ph.D. from Göttingen University.

DR. H. M. GORDIN, well known for his researches in pharmaceutical assaying, has been appointed Professor of Chemistry in the School of Pharmacy of Northwestern University. He was born in St. Petersburg, Russia, in 1860. He graduated from the University of Moscow in 1884, and then emigrated to the United States, establishing himself in San Francisco as a practising pharmacist, and after a few years of successful business returned to Europe, where he studied chemistry at Paris, Geneva, Munich and Berne. He graduated with the degree of Doctor of Philosophy at the University of Berne, Switzerland, in 1897.

DR. E. R. KENNEDY has been appointed Instructor in Materia Medica at the Philadelphia College of Pharmacy. He is a graduate of the Zanesville (Ohio) High School, of the Philadelphia College of Pharmacy and of Jefferson Medical College.

DAVID C. ECCLES, the newly appointed Instructor in Chemistry of the School of Pharmacy of Northwestern University, is the only son of Dr. R. G. Eccles, of Brooklyn, N. Y. He is a graduate of the Brooklyn High School and Columbia University; from the latter he has received the degrees B.S. (in chemistry) and A.M.

FRANCIS B. HAYS, associate editor of the *Druggists Circular* for eleven years, is now editor of the new publication, *Southern Drug Journal*, the first number of which appeared in April. With the reorganization of the South and the development of its industrial and educational facilities, the need of a drug journal representing its particular interests has been felt for some time. We therefore congratulate the editor and proprietors of the *Southern Drug Journal* upon the prospects and possibilities that lie before them.

# THE AMERICAN JOURNAL OF PHARMACY

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AUGUST, 1902.

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## COFFEE: ITS HISTORY AND COMMERCE—AN OUTLINE.

BY WILLIAM B. MARSHALL.

### I. BOTANY.

Generic name, *Coffea*. Several species belong to the genus, but only two, *C. Arabica*, L. and *C. Liberica*, Hiern., have commercial value. Coffee belongs to the plant order Rubiaceæ, which includes also the cinchona or quinine trees, the ipecacuanhas, madders, bedstraws, woodruffs and many other useful plants. Coffee and ipecacuanha belong to the sub-order Cinchonaceæ, of which, as the name would indicate, *Cinchona* is the type genus. All three are famous for their alkaloids—quinine in the bark of cinchona; caffeine in the seeds and leaves of coffee; emetine in the root-bark of ipecac.

### II. THE PLANT.

(1) *Stem* usually from 3 inches to 6 inches in diameter. In very old trees it may be more. Height of tree naturally from 15 to 25 feet. In cultivation it is kept within 6 to 10 feet.

(2) *Leaves* large, thick, tough, leathery, glossy, evergreen, placed opposite to each other on the branches.

(3) *Flowers* small, pure white, tubular, very fragrant. Corolla 4 to 5 cleft in *C. Arabica*, 9 cleft in *C. Liberica*. Clustered in the axils of the leaves. Bloom so profusely and simultaneously as to give the trees the appearance of being loaded with snow.

(4) *Fruit*, when ripe, resembles a cherry. Normally it contains two seeds, which are elliptic in outline, rounded above, flat below, and placed with the flat side of one against the flat side of the other. Each seed has a deep groove running lengthwise on the flat face.

Frequently but one seed develops in a fruit and it is then nearly oval. Coffee of this kind is known in commerce as pearl, pea-berry or male-berry. The seeds of Arabian coffee are greenish, brownish, yellowish or whitish. The seeds of Liberian coffee are much larger than those of the Arabian, are generally brownish, and have the groove deeply wrinkled along its edges.

Each seed is enveloped in a thin transparent tissue, called the silver skin. Outside of this is a thick, tough, parchment-like envelope called the parchment skin or husk. Enclosing both seeds is the pulp, which is moderately soft when fresh, but becomes hard and woody when dry and is then called the hull (and frequently also, by coffee dealers, the "pod"). The outer surface of the fruit is a skin which resembles the skin of a cherry.

The fruit is commonly called the *berry*, not because it is a true berry, but because it resembles one. The seed also is called the *berry*, as for example "flat-berry," "male-berry," "pea-berry," etc. The seed is called also the *bean*, possibly because it resembles a bean, and possibly from the Arabic word *bunn*, the name of the coffee tree in Arabia. The dried hull is called the *pod*, but there is nothing leguminous about it. The names cited for the various parts are bad botany, but good technical English for the coffee trade and good vernacular for all of us.

### III. GEOGRAPHY.

(1) *Origin*.—Nearly all the evidence points to Abyssinia as the original habitat of Arabian coffee. "*Coffea Arabica* is wild in Abyssinia, in the Soudan, and on the coasts of Guinea and Mozambique. Perhaps in these latter localities, so far removed from the centre, it may be naturalized from cultivation. No one has yet found it in Arabia, but this may be explained by the difficulty of penetrating into the interior of the country. If it is discovered there, it will be hard to prove it wild, for the seeds, which soon lose their faculty of germinating, often spring up round the plantations and naturalize the species. This has occurred in Brazil and the West Indian Islands, where it is certain that the coffee plant was never indigenous."—De Candolle, "Origin of Cultivated Plants." The botanic name, *Arabica*, and its English equivalent, *Arabian*, applied to this coffee are most probably misnomers, due to the fact that Arabia took a prominent part in introducing the use and cultivation of

coffee to the world at large. The use of those names has, in a great measure, helped and fixed the prestige which had already attached to Arabia as the original source of commercial supply. At the present day Arabia produces but a small and unimportant part of the world's supply, while in Abyssinia coffee has no importance whatever. Liberian coffee, as its name truly tells, originated in Liberia, and grows wild throughout that region.

(2) *Spread of Cultivation.*—The Dutch introduced coffee-growing in the East Indies, and began to send coffee to market from there about the beginning of the eighteenth century. In 1718 they began growing coffee in Surinam, South America, but general cultivation of coffee in the new world is not believed to have spread much from that source. It is generally believed that Martinique is the point from which cultivation spread on all sides, and that most of the coffee trees in America are descended from a slip which Le Clieu, a French naval officer, brought to Martinique from the Paris botanic garden in 1720. At the present time the number of coffee trees in Mexico, Central America, South America and West Indies is estimated at about 1,000,000,000.

(3) *Present Coffee Regions.*—At the present day coffee is cultivated generally throughout the tropics, viz., the lower half of Mexico, all of Central America, the West Indies, Northern South America—on the west coast as far as Peru, on the east almost to Northern Argentina—West Africa, East Africa, Southern India, Java, Borneo, Philippines, Hawaiian Islands, etc. Table No. 3, showing the sources of United States imports for 1900, will give a fair idea of the relative importance of the various coffee countries.

#### IV. CULTIVATION.

(1) *Arrangement.*—The trees are planted in rows 6 to 10 feet apart. On many plantations the plants are placed near each other in the row, the resulting growth being more or less hedge-like.

(2) *Shading.*—To prevent the soil from baking and cracking and thus breaking the tender rootlets, it is a common practice to plant quickly growing shade trees among the coffee. Bananas and rubber trees are much used for this purpose, as being valuable not only for their shade but also for their products. Among others, the legumes are favorites because the folding of their leaves at night permits the damp air to reach the soil. Frequently the coffee plantation is

formed on land already covered with full-grown trees. Often when the coffee trees have become large enough to shade the soil the other trees are cut out.

(3) *Pruning*.—Naturally the coffee trees would become 15 to 25 feet high. By "topping"—i.e., cutting off the top of the main stem—they are kept within 6 to 10 feet, chiefly for convenient picking. Naturally the branches would begin at about 4 feet from the ground and the top would be spherical. By pruning and training the tree is made nearly conical, the primary branches horizontal and to begin close to the ground. The pruning has the effect also of making new branches shoot out, thus increasing the yield of fruits.

(4) *Bearing* begins about the end of the third or fourth year, increases until the eighth or ninth year, after which it is nearly uniform. Profitable crops are yielded until the tree becomes 25 to 30 years old, and in some cases much longer.

(5) *Yield*.—From 2 to 3 pounds of merchantable coffee per annum seems to be a fair average for a good tree. Some authorities say as much as 8 pounds, while others place it as low as 1½ pounds.

(6) *Times of Harvest*.—The whole crop does not ripen at the same time, nor do the berries on each tree, hence several pickings are necessary. In Java the picking begins in January and continues three or four months. In Ceylon the chief crop is gathered from April to July and a smaller crop from September to December. In Brazil the harvest begins in April or May and continues until September.

#### V. PREPARATION FOR MARKET.

(1) *Pulping*.—In the primitive method of preparing the coffee the fruits are allowed to dry. When the pulp and parchment become brittle they are easily removed from the seeds by a pestle and mortar or other crushing process. The coffee thus prepared is called sundried or thick hull and is inferior. The best coffees are pulped as soon as picked. The fresh berries are placed in a tank from which a gently flowing stream of water feeds them to the pulping-machine. A common type of pulper consists of two metal plates with their surfaces close to each other and made to revolve in opposite directions. Projections catch and tear or crush away the pulp as the berries are fed between the plates.



(2) *Fermenting*.—The pulped coffee is placed in piles for a few hours in order that fermentation may take place in the matter which clings to the outside of the parchment.

(3) *Washing*.—It is then placed in tanks of water and vigorously stirred in order to wash away the slimy material resulting from the fermentation.

(4) *Drying*.—It is then placed on large cemented or bricked yards, called barbecues, and exposed to the sun. On many plantations each section of the drying yards has a little shed into which the coffee may be hurried in case of rain, and tarpaulins or mats are kept at hand for use at such times and to cover the nearly dried coffee in case the atmosphere becomes very damp. While drying the coffee is frequently turned by shovels and rakes or by shuffling among it with the feet. On some of the large plantations the use of the drying yard has been done away with, the coffee being dried on large shallow pans over steam coils. The advantage of this method is that it makes the operation independent of weather conditions. But the coffee dried on the barbecues has the advantage of being of better quality.

(5) *Hulling*.—This consists in removing the parchment skin which surrounds each seed. In drying the parchment becomes brittle, and the seed within it shrinks away from it, so that it will rattle like the nut in a peanut shell. Hence pressure will crack the parchment and free the seed. The machines used in hulling work on this principle.

(6) *Milling*.—This consists in rubbing off and winnowing aside the delicate silver skin. This skin is so thin and delicate that the slightest touch is sufficient to break it, and a little friction will remove all of it except a little which clings to the groove. Even in roasted coffee traces of the silver skin may be seen adhering to the groove.

(7) *Sorting*.—The coffee is now sorted according to size in revolving cylindrical or conical sieves, with small meshes near the entrance and larger meshes further along. A spiral channel or the slope of the sieve or the flare of the conical ones carries each grain along until it comes to a mesh large enough to permit it to fall through into the bin below. It is easy to tell coffees which have been sorted in this way, because they usually vary in size, contain some imperfect grains, and some male-berry in the pod. The male-berry fruits

are smaller than the common two-seeded variety and many of them pass through the pulping and other processes without change, because the machinery is gaged for larger fruits. On many plantations the sorting is done entirely by hand, or first by the sieve and then by hand. The work is entrusted to women and children, and so painstaking are they that nearly every grain is separately handled, and the beans in each of the various grades into which they separate the coffee are remarkably uniform in size, color and shape. The sorting and inspecting really begins with the picking of the fruit and is continued through all the processes. At every stage defective and inferior fruits and beans are removed whenever noticed.

(8) *Shipping*.—The coffee is bagged and sent to the nearest exporting point. The means of transportation used include all kinds, from the most primitive up to steam. Each coffee country has one or more principal coffee ports or markets, as for instance Rio and Santos in Brazil, Laguayra and Maracaibo in Venezuela, Vera Cruz in Mexico, Kingston in Jamaica, Aden in Arabia, Batavia in Java, etc.

(9) *Roasting*.—This important process develops the volatile oil to which most of the taste and aroma are due. The oil is not present in the raw bean; but in roasting, it develops to the extent of one part of oil to fifty thousand parts of coffee. The roasting is important also for making the coffee brittle, so that it may easily be ground. The roasting causes an increase of 30 to 50 per cent. in bulk. The decrease in weight amounts to about 18 per cent. when the coffee is roasted chestnut brown, or from 23 to 25 per cent. when it is nearly black. Various types of roaster are in use. Perhaps the most common is that in which a perforated cylinder slides in and out of the furnace on an iron rod, on which it may be revolved. The turning of the cylinder insures equal roasting and prevents burning. Some roasters are spherical and have a compound motion which tumbles the coffee about in all directions. After roasting, the coffee is spread in thin layers for rapid cooling. If piled, it steams or sweats. Some roasters strew sugar over the coffee while it is still hot to give it a glaze, which will keep the aroma from escaping. Various other glazing materials are in use. Raw coffee improves with age. Roasted coffee rapidly loses in quality.

VI. COMMERCE.

TABLE NO. 1.—WORLD'S PRODUCTION OF COFFEE IN TONS.

Year.	Brazil.	Other Countries.	Total.
1832 . . . . .	50,000	45,000	95,000
1844 . . . . .	120,000	135,000	255,000
1855 . . . . .	163,000	158,000	321,000
1865 . . . . .	200,000	222,000	422,000
1875 . . . . .	255,000	233,000	488,000
1885 . . . . .	382,000	329,000	718,000
1892 . . . . .	440,000	260,000	700,000
1897 . . . . .	590,000	250,000	840,000
1898 . . . . .	650,000	260,000	910,000

At the present time Brazil produces about three-fourths of the world's supply. Coffee is the most important product of that country. The product of other American countries added to that of Brazil constitutes about nine-tenths of the world's entire supply.

TABLE NO. 2.—CONDENSED ANALYSIS OF U. S. IMPORTS OF COFFEE, YEARS  
 ENDING JUNE 30, 1899, 1900, 1901.\*

From	Pounds, 1899.	Dollars, 1899.	Pounds, 1900.	Dollars, 1900.	Pounds, 1901.	Dollars, 1901.
Mexico . . . . .	27,324,827	2,686,248	35,327,921	3,312,668	20,432,539	1,959,994
Central America . . . . .	45,298,800	5,368,711	43,786,494	4,356,407	60,630,913	6,115,335
West Indies . . . . .	11,701,202	945,622	9,249,729	731,323	7,324,116	579,327
Brazil . . . . .	628,417,812	35,253,834	601,520,169	34,333,762	666,470,673	45,004,299
Other South America . . . . .	90,332,351	7,217,590	58,662,464	4,595,751	72,272,403	5,874,326
Total from America . . . . .	803,074,992	51,472,605	748,546,777	47,329,851	827,130,644	59,533,281
East India . . . . .	10,504,177	1,502,493	23,263,971	3,383,921	14,576,640	1,763,370
Other Asia and Oceania . . . . .	5,290,164	840,736	3,929,624	602,075	3,112,175	472,814
Total from Asia and Oceania . . . . .	15,794,341	2,343,229	27,193,595	3,985,996	17,688,815	2,236,184
Africa . . . . .	642,003	104,971	125,151	15,025	64,028	6,580
Europe . . . . .	10,743,666	1,138,385	12,049,015	1,128,962	9,948,827	1,078,828
Other countries . . . . .	1,572,661	216,880	77,373	8,109	38,936	6,576
Total imports . . . . .	831,827,663	55,275,470	787,991,911	52,467,943	854,871,310	62,861,459

\* While the totals for the year 1900 as shown in Tables 2 and 3 agree, there are discrepancies in some of the items. For instance, in Table 2 Brazil is credited with 601,000,000 pounds, while in Table 3 it is credited with only 596,000,000. Both tables were prepared from data published by the Bureau of Statistics of the Treasury Department and the discrepancies occur in those data.

TABLE NO. 1a.—ESTIMATED PRODUCTION OF COFFEE—1898.

Country.	Pounds.
Brazil . . . . .	1,533,840,000
Venezuela . . . . .	116,407,800
Guatemala . . . . .	60,238,000
Hayti . . . . .	57,000,000
Mexico . . . . .	48,145,492
Costa Rica . . . . .	35,461,407
Colombia . . . . .	34,549,639
Porto Rico . . . . .	26,400,000
Salvador . . . . .	16,500,000
British West Indies . . . . .	13,200,000
Ecuador . . . . .	9,858,892
Peru . . . . .	2,733,305
San Domingo . . . . .	2,400,700
Dutch West Indies . . . . .	924,000
Hawaii . . . . .	726,000
Honduras . . . . .	612,480
Bolivia . . . . .	495,000
Paraguay . . . . .	343,407
Dutch Guiana . . . . .	219,166
Cuba . . . . .	132,000
Belize . . . . .	132,000
Total, America . . . . .	1,960,619,288
Java . . . . .	101,904,000
Ceylon and India . . . . .	31,650,000
Padang . . . . .	5,940,000
Celebes . . . . .	5,940,000
Total, Asia . . . . .	145,464,000
Grand total . . . . .	2,106,083,288

TABLE NO. 3.—U. S. IMPORTS OF COFFEE—YEAR ENDING JUNE 30, 1900.

From	Pounds.	Dollars.	Av. Value per lb., Cts.
Mexico . . . . .	35,327,921	3,312,608	9'38
Central America—Guatemala . . . . .	17,528,262	2,689,313	11'92
Costa Rica . . . . .	17,319,329	1,478,334	8'53
Salvador . . . . .	6,616,775	570,002	8'61
Nicaragua . . . . .	1,748,642	169,250	9'68
Honduras . . . . .	579,849	50,039	8'63
British Honduras . . . . .	20,725	1,858	9'11
West Indies—Haiti . . . . .	5,348,612	412,645	7'71
British W. I. . . . .	3,541,930	265,966	7'22
Santo Domingo . . . . .	479,716	36,736	7'66
Porto Rico . . . . .	103,261	10,236	9'09
Dutch W. I. . . . .	36,210	3,588	9'91
Cuba . . . . .	29,950	2,156	7'20
Danish W. I. . . . .	50	6	12'00
South America—Brazil . . . . .	596,231,207	33,905,059	5'69
Venezuela . . . . .	42,444,443	3,532,511	8'32
Colombia . . . . .	20,050,195	1,397,684	6'97
Ecuador . . . . .	750,854	62,458	8'32
Dutch Guiana . . . . .	409,601	31,699	7'74
Peru . . . . .	1,660	102	9'62
Asia—Aden . . . . .	1,719,639	284,215	16'53
British East Indies . . . . .	5,950,243	448,380	7'53
Dutch East Indies . . . . .	17,313,728	2,935,661	16'95
Turkey-in-Asia . . . . .	146,711	21,536	14'68
Other Asia . . . . .	1,256,512	184,272	14'32
Oceania—Guam . . . . .	800	120	15'00
Hawaii . . . . .	448,119	64,428	14'38
Africa—Liberia . . . . .	34,353	2,936	8'54
Portuguese Africa . . . . .	5,000	690	13'80
Other Africa . . . . .	79,248	10,000	12'60
Via non-producing countries—			
Netherlands . . . . .	3,003,487	325,918	10'85
Germany . . . . .	2,657,990	215,704	8'11
United Kingdom . . . . .	2,597,490	250,504	9'65
France . . . . .	2,159,254	180,117	8'35
Belgium . . . . .	944,764	99,131	10'49
Portugal . . . . .	556,049	42,789	7'69
Austria-Hungary . . . . .	119,100	13,699	11'50
Italy . . . . .	8,850	1,000	11'26
Quebec, Ontario, Manitoba, etc. . . . .	31,001	2,676	8'63
British Columbia . . . . .	19,857	3,014	15'18
Chinese Empire . . . . .	329,444	47,004	14'27
Hong Kong . . . . .	12,250	1,769	14'44
Total imports . . . . .	787,991,911	52,467,943	6'66
U. S. Exports for same period . . . . .	39,191,140	3,690,817	9'42

TABLE NO. 4.—NET IMPORTS, TOTAL VALUE, AVERAGE VALUE PER POUND AND PER CAPITA CONSUMPTION DURING CERTAIN YEARS, 1850-1901.

Year ending June 30th.	Net Imports in Pounds.	Value of Net Imports in Dollars.	Average Value of Imports— Cts. per lb.	Per Capita Consumption in U. S. in lbs.
1850 . . . . .	129,791,466	9,918,472	7'6	5'60
1855 . . . . .	175,150,440	15,486,423	8'8	6'43
1860 . . . . .	182,049,527	19,615,106	10'8	5'8
1865 . . . . .	84,316,045	5,525,653	6'6	2'4
1870 . . . . .	231,173,574	23,824,043	10'3	6'0
1875 . . . . .	311,136,651	49,311,334	15'8	7'08
1880 . . . . .	440,128,838	59,416,196	13'5	8'78
1885 . . . . .	539,264,356	43,389,270	8'2	9'60
1890 . . . . .	490,161,900	76,750,979	16'0	7'83
1895 . . . . .	643,234,766	94,599,880	14'7	9'33
1900 . . . . .	748,800,771	48,777,126	6'5	9'81
1901 . . . . .	854,871,310*	62,861,499*	7'3*	10.10*

\* Gross imports.

*Rank of Coffee among our Imports.*—In value coffee is near the front among our imports. It usually holds second, third or fourth place. Sugar generally holds first place; silk, coffee and wool holding second, third and fourth places. In recent years the imports of wool have dwindled, and various other articles exceed in value the value of the wool imported.

TABLE NO. 5.—IMPORTS OF SOME IMPORTANT ARTICLES IN MILLIONS OF DOLLARS.

Calendar Year.	Sugar.	Silk. (Raw & Mfd.)	Coffee.	Wool. (Raw & Mfd.)
1890 . . . . .	90'	60'9	84'4	69'4
1895 . . . . .	67'9	60'6	96'5	94'1
1901 . . . . .	79'6	69'6	70'1	29'6

## VII. CHEMISTRY.

It is an interesting fact that the great table beverages—coffee, tea, cocoa and yerba maté (also kola and guarana)—agree in having in their composition the alkaloid theine (caffeine), or the analogous one, theobromine in cocoa. All have also tannic compounds, and in each the taste is principally due to extremely small quantities of essential oil. Richter gives the percentages of theine as follows:

In beans and leaves of coffee,  $\frac{1}{2}$  per cent.; in tea, 2 to 4 per cent.; in yerba maté, 5 per cent.; in guarana, 5 per cent. According to Payen, cocoa contains 2 per cent. theobromine. Reports of analyses vary much, but there seems to be no doubt that coffee contains less of the alkaloidal principle than any of the other beverages. The changes effected by roasting are shown in the following analyses:

CHEMICAL COMPOSITION OF COFFEE (PROF. HASSALL).

	Raw. Per Cent.	Roasted. Per Cent.
Caffeine (theine) . . . . .	1'10	1'06
Fat . . . . .	11'42	8'30
Extractives (caramel, gum, tannin) . . . . .	14'03	26'28
Gluten . . . . .	10'68	12'03
Cane sugar . . . . .	8'18	1'84
Water . . . . .	8'26	0'36
Cellulose, etc. . . . .	42'36	44'96
Ash . . . . .	3'97	5'17
	<hr/> 100'00	<hr/> 100'00

AVERAGE COMPOSITION OF ROASTED COFFEE (A. H. CHURCH).

	Per Cent.	In One Pound.	
		Ounces.	Grains.
Caffeine (theine) . . . . .	1'0	0	70
Fat or oil . . . . .	12'5	2	0
Tannin . . . . .	5'0	0	350
Minor extractives . . . . .	14'4	2	133
Albuminoids . . . . .	12'5	2	0
Water . . . . .	2'0	0	140
Cellulose . . . . .	48'0	7	297
Mineral matter . . . . .	4'6	0	322
	<hr/> 100'0	<hr/> 1 lb.	

FOOD ANALYSIS OF UNROASTED COFFEE (PAYEN).

	Per Cent.
Flesh-formers . . . . .	14'75
Heat-givers . . . . .	66'25
Water . . . . .	12'00
Mineral matter . . . . .	7'00
	<hr/> 100'00

VIII. EFFECTS.

In the United States coffee is an extremely popular beverage. It is estimated that about 70 per cent. of our people are habitual coffee drinkers. As a rule we use a decoction of only one-half the strength of that used in Brazil, France, Turkey and some other countries.

As used in those countries it is believed to be injurious to the nerves and stomach, but the weak decoction used here is non-injurious, but rather beneficial. It cheers and refreshes and gives zest to other foods. The caffeine is mildly stimulating and has a restful effect upon body and mind and tends to restore them to normal condition after they have undergone exertion. The most important effect of coffee is its tendency to diminish the waste of tissue which is going on at every moment, and as Doctor Hutchinson says, "it consequently permits the performance of excessive labor upon an economical and inadequate diet." Laborers are great coffee drinkers, and the military departments of many governments give coffee a place in the regular rations of army and navy.

Dr. Kane says of the use of coffee during his Arctic explorations: "After repeated trials the men took kindly to coffee in the morning and tea in the evening. The coffee seemed to continue its influence throughout the day and they seemed to grow hungry less rapidly than after drinking tea, while tea soothed them after a day's hard labor and the better enabled them to sleep. They both operated upon fatigued men like a charm, and their superiority over alcoholic liquors was very decided." Temperance advocates would gladly see coffee displace beer, rum, whisky, etc.

Coffee contains less astringent principle than tea and consequently tends less to retard the action of the bowels, a tendency which is still further diminished by the aperient effects of the volatile oil. Von Liebig's investigations show that coffee is valuable in increasing when necessary the secretion of bile. On the other hand, when bile is superabundant the use of the beverage should be suspended. Occasionally coffee gives heartburn or other forms of indigestion, or causes sleeplessness; but this is generally due to an unwise or untimely use of it.

With tobacco, opium, alcoholic liquors and some other materials our desire will not admit that plenty is enough. Take a little, the system hints for more; take more, it asks for more, then demands more, insists on more and pleads for more until, figuratively speaking, one becomes a mere skinful of nicotine, or a seesaw from dreamland to despair, or, like Duke Clarence, is drowned in a butt of Malmsey. But with coffee, tea and cocoa, as with water, enough is enough in nearly all cases, and victims of these beverages are rare. I have heard of tea-topers and coffee-topers, but have never known one.



Notwithstanding the scare advertisements of health-substitutes for coffee, there is no cause for apprehending danger to the race at large from coffee-drinking. After generations of almost universal coffee-drinkers, our own times see men of gigantic intellect in all realms of activity; our athletes are able to make sudden bursts of effort equal to any in history, and our soldiers acquit themselves manfully in fatiguing campaigns in torrid climes. It is not noticeable that physicians taboo the use of coffee at their own tables. The life-insurance companies, constantly warring against all that lessens longevity or conduces to abnormal organs, nerves and actions, seem content to accept the use of coffee as one of the ordinary elements of everyday life.

Users of tobacco find that the stimulating effect of coffee offsets to a considerable extent the depressing effect of the tobacco. We may liken this to urging a horse forward with the whip while restraining him with the reins, thus getting average speed.

Table No. 4, showing the per capita consumption in this country, tells that the beverage has popular approval, or at least that there is determination to use it, whether its effects be good, bad or indifferent.

#### IX. COMPETITORS.

Tea, cocoa and yerba maté or Paraguay tea are the competitors of coffee. All resemble each other in essentials of composition, in the manner of infusing, in the way they are used and in their effects. In eastern Asia coffee has small hold, tea holding the affections of the people. In the lower half of South America yerba maté is in everyday use. In our own country tea is hardly a competitor, but rather a colleague, the two beverages having their own distinct fields of usefulness. With us cocoa ranks rather as a dainty than as a daily drink. But few of our people have ever heard of yerba maté and efforts to introduce its use do not appear to have been very successful. During the calendar year 1901 we imported 1,072,000,000 pounds of coffee at \$70,100,000; 68,200,000 pounds of tea at \$8,700,000; 50,400,000 pounds of cocoa at \$6,700,000.

#### X. ADULTERANTS AND SUBSTITUTES.

Among the adulterants are chicory root, dandelion root, acorns, etc. Some years ago imitation coffee beans were molded from

flour, bran, etc., and used to adulterate the unground coffee. Chicory root, mogdad or negro coffee (the seeds of *cassia occidentalis*), the seeds of several other species of *cassia*, the seeds of the wax palm, the seeds of several species of *astragalus*, roasted dates and figs are common substitutes for coffee, and there are many others. It is an interesting fact that some substitutes are in use in even the great coffee region; as, for instance, the seeds of the wax palm in Brazil. None of the substitutes contain caffeine.

Several kinds of health "coffees," made principally of cereals—wheat, rye and barley—roasted, are on sale in many of our groceries.

The leaves of the coffee tree contain a large quantity of caffeine and are often used in Sumatra in place of the seeds.

#### XI. HISTORY OF THE USE OF COFFEE.

It has been used in Abyssinia since time immemorial. In Arabia it was probably first used early in the fifteenth century at Aden, whence its use spread to Mecca, to Cairo, to Damascus, to Aleppo and finally to Constantinople, where the first coffee house was established in 1554. The first coffee house in Great Britain was opened in 1652 by a Greek named Pasqua Rossie, who "was servant to an English merchant named Edwards, who brought some coffee with him from Smyrna, and whose house, when the fact became known, was so thronged with friends and visitors to taste the new beverage that to relieve himself from annoyance, Edwards established his servant in a coffee house." In France coffee was first used in Marseilles in 1658 by Thevenot, a citizen who on returning from travels in the East "regaled his guests after dinner." The first coffee house in France was opened in Marseilles in 1671 and the first in Paris in 1672. The Germans began to use the beverage about 1756, more than a century after it had come into common use in England and France. In England and Germany coffee-drinking met opposition of a political nature. In Turkey it was opposed by the Mohammedan priests, but in all those countries it bounded into popularity. In France it received the patronage of persons in high station, but its progress in popularity was very slow as compared with that in the countries offering opposition. Cocoa was the first of the dietary beverages to come into use in Europe, coming from South America through the Spaniards; coffee came next, from Arabia by way of Constantinople; tea came third, from China through the Dutch and Portuguese.

## DROPS AS DOSE MEASURES.

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Drops have been the subject of such a number of contributions to medical, as well as pharmaceutical literature, that any further addition would appear to require some valid excuse for being presented.

Such an excuse is found in the fact that despite the vast amount of work that has been done in this direction, practically the only point that all investigators agree on is that drops differ materially in size and weight. To get some idea as to the present status of the question, the writer has attempted to make a comparative study of the views held by different investigators, and will endeavor to present the essential features of these different views in as compact and condensed a form as possible.

The question that suggests itself at the outset is, "What is a drop?"

As answer we might give a definition, somewhat in the manner of the dictionary, as follows: "A drop is a self-constituted mass of liquid matter held together by the attractions of its molecules and having a marked tendency of assuming a spherical form." While a definition of this kind describes the physical properties, shape and composition of a drop, it gives us little or no indication of what is meant when a doctor directs a medicine to be taken in drop doses.

Drops have been in use by medical practitioners for a great number of years, but have always been considered a more or less unsatisfactory quantity, on account of the almost insurmountable difficulties that are encountered in attempting to bring them within the bounds of any rule or law by means of which their size or weight might be regulated or determined.

In Volume I of THE AMERICAN JOURNAL OF PHARMACY we find an exhaustive paper by Elias Durand, in which the writer calls attention to the variation in the size of drops and their unreliability as measures of capacity. Besides giving a list of the number of drops necessary to equal 20 minims, or to weigh 20 grains, the writer also makes some interesting observations, a few of which we will have occasion to refer to later. He also makes an interesting historical statement, but unfortunately does not give any dates. According

to this paper by Durand, a Doctor Shuttleworth of Liverpool was the first to call attention to the danger attending the administration of potent remedies in doses. Dr. Shuttleworth, in an elaborate paper, is said to have called attention to the variation or difference in the weight of drops of different substances. According to Durand, the discussion that ensued from this particular paper was the direct cause of the adoption, by the College of Physicians of London, of the *minim*, this latter, as is well known, being the sixtieth part of a fluid drachm.

That this term was soon confounded with being the equivalent of a drop is evident from the definition of a *minim* given by W. T. Brande, a writer on chemical subjects, in the early decades of the nineteenth century. Brande describes the *minim* as being "the smallest liquid measure—generally regarded as being about equal to one drop."

Among the men who have contributed to the confusion and misapprehension that exists at the present time on the subject of drops, probably no one individual has contributed more than Hahnemann, the founder of homeopathy. As is well known, he adopted the drop as the standard of capacity in making dilutions. According to Hahnemann, the weight of a drop of water, or of a solution of a substance in water, is the equivalent of one grain in weight; a drop of alcohol, or alcoholic liquid, is the equivalent of half a drop of water, or half a grain in weight. These equivalents are still used by homeopathic practitioners, and are made the basis of the formulas for dilutions as given in the latest edition of the *Homeopathic Pharmacopœia* by Schwabe.

Hahnemann, however, was not alone in making general statements of this kind. Among others, the "*Pharmacopœia* of the Massachusetts Medical Society, Boston, 1808," says that "60 drops of water, 100 of diluted alcohol, or 120 of alcohol are equal to a drachm by measure."

These general statements or teachings gradually gave way, in regular practice at least, to a more or less complete acceptance of one or the other of the numerous drop-tables that have been published from time to time. The first of these that was generally adopted in this country was the one by Durand, mentioned above. In including this in the different formularies and dispensatories it was generally revised so as to make it read: "The approximate

number of drops in a fluid drachm." In addition to this we find in THE AMERICAN JOURNAL OF PHARMACY alone, drop-tables by J. J. Bernouilly, 1859, page 442; Barnard S. Proctor, 1860, page 430; S. L. Talbot, 1880, page 337, and A. H. Kinsey, 1884, page 181.

In view of the fact that drop-tables have been incorporated in many of the pharmaceutical textbooks, and are considered as being more or less authoritative, it will probably be of more than passing interest to compare the essential features of a few of these different tables, with a view of determining whether or not any general deductions may be drawn from them.

TABLE NO. I.—GIVING THE NUMBER OF DROPS OF DIFFERENT SUBSTANCES NECESSARY TO WEIGH ONE GRAMME ACCORDING TO THE AUTHORS QUOTED.

Author.	Published in or quoted by	Water.	Alcohol.	Ether.	Chloroform.	Fowler's Solution.	Tincture of Digitalis.	Wine of Opium.
Durand	Ellis' Formulary	13	49	59		17	35	22
Bernouilly	A. J. P.	14	39	53	33			18
Hager	Hager's Handbook	16	40	50	25	16	25	20
Dorvault	L'Officine	20	59	76	54	23	58	34
Talbot	U. S. Dispensatory	16.5	51	69	48	16	37	28
Raymond	Druggists Circular	20	61	90	56	23	53	33
Leaman	Meyer Bros. Druggist	28	80	107	76	35	63	44
Eschbaum	Ber. Der. Pharm. Gesellschaft	10	33	42	26.5			
Harnack	Proc. G. Ph. A.	14	41	47.5	33	21	34	23
Eschbaum	Ber. Der. Pharm. Gesellschaft, 1902	13.8	45	57	37	22	37	21
Wilbert	With Fixed Dropper	10	30	41	28	12	24	19.5
Wilbert	Dropping Bottle	10	42	60	44	15	31	23

Table No. I will give us a very fair idea as to the reliability of these various drop-tables. It will be noted that the quantities given are all figured out for the number of drops that are required to weigh 1 gramme; this has been done to facilitate comparison. The tables, according to Durand and Talbot, have been calculated according to the weight of a drachm of the respective preparations in grammes, as given in the later editions of the United States Dispensatory. The table by Bernouilly was based on the number of drops required to weigh a drachm, and this in turn was calculated

to grammes. The table in Dorvault's *L'Officine* is in the metric system, as are the remaining ones that are quoted. The additional series, made by the writer, were added to demonstrate the possible variation that may be obtained by using different dropping surfaces, the fixed dropper being an adaptation of the "Decigramme pipette" (mentioned on page 133 of the *AMERICAN JOURNAL OF PHARMACY*, 1902) to a separating funnel, and this in turn was clamped in a burette stand, with the object of eliminating any error due to vibration. The dropping bottle was of the ordinary type, but with rather a pointed lip or outlet, causing marked reduction in the dropping surface for the more volatile liquids.

A careful study of even this limited number of liquids should convince any one that there is little or no promise of being able to generalize on the relative sizes of drops that should be dropped from different surfaces or different dropping devices.

If we take, for instance, the relative weight of distilled water and Fowler's solution, we will find that this varies from 1· to 0·969, as given by Talbot, or 1· to 1·, as given by Hager, all the way up to 1· to 1·592, as given by Eschbaum in his latest list. Some of the other variations are so apparent that it will not be necessary to go into detail regarding them.

One other interesting feature, in this same connection, might be illustrated by making a selection from the triple drop-table by Kinsey (*A. J. P.*, 1884, page 181). This writer gives a long list of preparations, from which we have selected the following instructive list:

TABLE NO. 2.—NUMBER OF DROPS NECESSARY TO MEASURE ONE FLUID DRACHM.

Dropped from	Shop bottle.	Glass Stopper.	Minim Measure.
Acid hydrobromic dilute . . . . .	57	65	70
Acid hydrochloric dilute . . . . .	70	50	62
Acid nitric dilute . . . . .	63	60	81
Acetum sanguinaria . . . . .	102	92	92
Fowler's solution . . . . .	58	61	77
Spirit of ammonia, aromatic . . . . .	108	87	139
Tincture of cannabis indica . . . . .	124	120	98
Tincture of capsicum . . . . .	116	88	143
Tincture of colchicum . . . . .	86	80	124
Tincture of digitalis . . . . .	114	79	145

This selection, of course, illustrates primarily that drops differ materially in size. If the original work on the table, however, was

carefully done (and there is every reason to believe that it was), the main object-lesson to be obtained from it is, that we can expect little or no uniformity in comparative results or the number of drops to be obtained from different dropping surfaces. It will be noted that drops of the first liquid quoted, from a shop bottle, are apparently smaller, while those of the second, for no evident reason, are larger than those dropped from either a glass stopper or a minim measure. There are other discrepancies of the same kind in the list as quoted; in fact, the irregularities are so apparent and so great that they would certainly appear to suggest that every dropping surface is a law unto itself with each and every liquid. So that, even if we know the comparative number of drops of one or more liquids, dropped from two different surfaces, we cannot with any degree of certainty predict what the number of drops of any additional liquid would be, calculating from the available data for only one of the dropping surfaces.

Despite this evident variation in the different results obtained, it has been proposed that the coming Pharmacopœia include a definition of a standard drop and a description of a standard dropper, this official standard to be based on that adopted by the French Codex. This latter authority says that 20 drops of distilled water should weigh 1 gramme. The Swiss Pharmacopœial Revision Committee is also considering a proposal for an official definition. This is, that a drop of distilled water is the one twenty-fifth part of a gramme, or that 25 drops of distilled water should weigh 1 gramme. The Germans, however, have demonstrated to their own satisfaction, that neither of these quantities are reasonably constant, and, according to one investigator, a drop of distilled water is the fourteenth part of a gramme, while, according to another, it takes 13.8 drops to weigh a gramme. In our own country, at the present time, it is popularly supposed that a drop is equivalent to about the sixteenth part of a gramme, or 1 minim.

A more reasonable and practical standard would be to accept a drop of water as being equivalent to the tenth part of a gramme. This would certainly be a convenient number to remember, and would also be in harmony with the metric system of weights and measures. In addition to this, it would represent the most readily obtained drop of water, dropping in seconds, from the greatest variety of dropping surfaces. Such a drop might be defined as

being "the largest drop of distilled water readily obtained from any available surface, more than 5 mm. in diameter, dropping not slower than 1 drop a second."

Another advantage to be found in accepting this low number of drops as a popular equivalent, would be the placing of all possible error on the side of safety.

The following tables illustrate a series of experiments that were made with different dropping surfaces, in everyday use, with the object of determining their probable average and their possible variation. In this connection the writer would also call attention to the table on page 133 (*A. J. P.*, 1902), mentioned above.

TABLE NO. 3.—NUMBER OF DROPS OF DISTILLED WATER THAT WERE REQUIRED TO WEIGH 1 GRAMME, DROPPED IN SECONDS, FROM THE SURFACES INDICATED.

	Diameter of Neck of Bottle.	Number of Drops.	
		Low.	High.
10 c.c. vial . . . . .	22 mm.	9	12
25 " " . . . . .	22 "	9	11
50 " " . . . . .	24 "	10	14
100 " " . . . . .	26 "	9	11
150 " " . . . . .	28 "	9	12
200 " " . . . . .	29 "	9	11
250 " " . . . . .	32 "	11	13
1 oz. vial, thin lips . . . . .	26 "	11	13
2 " " " " . . . . .	34 "	15	15
8 " G. S. shelf bottle . . . . .	38 "	9	12
16 " " " " . . . . .	42 "	9	11
32 " " " " . . . . .	49 "	9	11

TABLE NO. 4.—NUMBER OF DROPS OF DISTILLED WATER THAT WERE REQUIRED TO WEIGH 1 GRAMME, DROPPED IN SECONDS, FROM THE DIFFERENT DROPPING DEVICES INDICATED.

T. K. dropping bottle, flat stopper . . . . .	13	to 16
" " " " " " . . . . .	13	" 15
" " " heart-shape stopper . . . . .	14	" 20
American dropping bottle . . . . .	9	" 12
German " " . . . . .	9	" 11
" " " thin lips . . . . .	10	" 15
Sallerones dropping flask . . . . .	15	" 18
Proposed standard dropper (outlet 3 mm.) . . . . .	10	" 26
Décigramme dropper . . . . .	9.5	" 11
Same principle applied to a dropping funnel . . . . .	10	"

It will be apparent to every one that these figures are at variance with the results of investigators as usually published. They can



readily be verified, however, by any one who has access to a reliable prescription scale, a number of bottles and some distilled water. The figures given here represent the highest and lowest of the results that were obtained. In each case, upwards of ten experiments were made, the object being to determine the effect different quantities of water would have on the size of the resulting drop. From the writer's experiments it would appear that the difference in the space and thickness of the lip of a vial is a greater factor in the size of the resulting drop than in the quantity of liquid that the vial contains. In this series the larger drops were sometimes obtained with a vial nearly full to the neck, while in some of the experiments the drops from a half-filled vial were the largest. The observation made by Durand, and mentioned in his paper, that the first drops from a fresh dropping surface were the smallest was found to be correct. This is, of course, readily explained when we remember that the size of the drop depends largely on the area from which the drop grows, or on which it is being formed, irrespective of the available amount of surface from which it might grow. There are so many factors that enter into the possible attraction or lack of attraction that a given substance has for any particular liquid, that we cannot enter into a discussion of this subject in a paper of this kind. Suffice it to say that a rough or ground-glass surface offers more attraction for the spread of a liquid, and would give a larger and more uniform drop of water than one that is quite smooth. A clean smooth surface, however, would give more uniform and larger drops than one coated even with the slightest trace of fat or oil.

The amount of variation in the weight of the drop, as obtained from the T. K. dropper, Table No. 41, is also interesting, particularly in view of the fact that nearly all of the recent drop experiments in Germany have been made with dropping bottles of this type. While it is true that by means of this device drops are readily and steadily formed, the great accuracy and uniformity that are claimed for them are not apparent from the results obtained by the writer. From the available data it is evident, that before we can expect to lay down any fixed or definite rule as to the size and weight of a drop we must have a device or means by which we can, under various conditions, obtain correlating results. There are, of course, even at the present time, several ways by means of which we

can obtain drops that will vary little or not at all from any desired standard that we care to name. Let us consider, for example, the equivalent adopted by the French Codex. The original standard was no doubt established by the use of a so-called "Sallerones dropping flask." This device is usually figured in French and also in German books on Pharmacy, but is practically unknown in this country. It consists of a small Florence flask, with a tubulature at the side placed at such an angle that the drop is formed squarely on the end or mouth of the tube. In the more reliable flasks the end of this tube is ground flat so as to prevent any tendency of the fluid to creep upward and in this way increase the dropping surface of the tube, and also the weight of the resulting drop.

A second reliable method of obtaining correlating results is to have a pipette, or dropping funnel, with an opening of the required outside diameter (3.3 mm.) and having the lower end ground, as in the case of the Sallerone dropper. If this apparatus is firmly fixed in a burette holder, and the portion above the outlet or dropping surface be kept dry, we can secure, with a reasonable amount of accuracy, 20 drops of distilled water to a gramme.

A tube on the pipette principle is not so satisfactory. This is partly due to the quiver and shake that is necessarily imparted by compressing the bulb or nipple, but more largely to the gradual creeping up of the liquid and the consequent increase in the cross section of the dropping area, resulting in a corresponding increase in the size and weight of the drop. As has been pointed out on a previous occasion, a slight tilting of the pipette has a somewhat similar effect, by increasing the surface from which the drop is being formed.

Admitting then that drops, as ordinarily produced, are necessarily variable, and that it is practically impossible to obtain uniform results, the question naturally arises, Why should we not dispense with drops entirely and endeavor to introduce some more definite measure of capacity? While this is no doubt possible in some cases, still it must be remembered that drops are of advantage in the administration of many forms of remedies. For instance, in cases where the relative amount of a drug or preparation is of importance, or where the dose of some potent remedy is to be alternately increased and decreased. Among remedies that are occasionally given in this way, we might mention the different solu-

tions of arsenic and its salts, solution of potassium iodide, tincture of digitalis, or tincture of nux vomica.

With several of these preparations the initial dose is of comparatively little importance, the object that is usually sought being to find out the amount that will be readily tolerated by the patient. For this purpose the dose is gradually increased until marked evidences of physiological action manifest themselves, then the dose is either decreased slightly and continued, or in some cases decreased again gradually to the starting point. The advantages possessed by drops as dose measures in practices of this kind are quite apparent, especially if we consider that the actual dropping would probably be done by the same person and in the same way, so that there would be little or no probability of any serious error or differences in the quantities measured out.

This practical use or application of drops would also appear to offer another reason for adopting, as the popular idea of a drop, the maximum quantity that may be obtained by any of the usual methods of dropping.

There are two points, or lessons, to be derived from this comparative study of drops that the writer would like to call particular attention to.

The first, of course, is, that the dropping of approximate quantities, where weights or measures are directed, is a habit that is reprehensible, and should not be countenanced or practiced under any conditions. For use at the dispensing counter a graduated pipette, as suggested by the late Dr. Squibb, is the most reliable instrument for measuring out small quantities of a liquid.

The second point is, that it would appear impracticable at the present time to adopt a fixed standard for a drop or dropper; unless, of course, we were able to compel every one to use an accurately made and somewhat complicated dropping device. Otherwise the factors that enter into and govern the size of the drop are too numerous to be brought under control in the present state of our knowledge.

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## SHOULD PHARMACISTS ALWAYS FOLLOW OUT THE RULES LAID DOWN IN THE PHARMACOPŒIA?<sup>1</sup>

BY JOSEPH P. REMINGTON.

Upon seeing this query in the list the writer felt a little shock, because it at first seemed to give the authority of this Association to what might be termed disloyalty to the U. S. Pharmacopœia, and this was undoubtedly not the intention of the framer of the query. It, however, furnishes a text for some remarks. The necessity of a pharmacopœia is universally recognized, for the same reason that we acknowledge the absolute need of laws for the governing of our conduct as citizens of the Republic and for the protection of all,

<sup>1</sup> Read at the annual meeting of the Pennsylvania Pharmaceutical Association, June, 1902, in reply to query No. 29.

and it might be well to continue this parallel; for although the U. S. Pharmacopœia is not published by any government or legal authority, it is accepted by the Government and most State laws as authoritative. We must have a standard, not only to determine the strength and purity of medicines, but if the processes of the Pharmacopœia can be replaced at the will of the operator by any substitutes which occur to his mind, there is great danger of so weakening its authority that a loose, chaotic condition may justly be feared. It is true that many laws on our statute books have been called "dead letters," because they have been found to be inoperative, defective, or thoroughly against public opinion, and thus difficult to enforce; but this is not paralleled in the case of the U. S. Pharmacopœia. Very few errors, comparatively speaking, were found in the U. S. Pharmacopœia of 1890, and most of these were corrected after the first edition appeared. It seems to be absolutely impossible to produce a book which is absolutely free from errors, but in a careful study of hundreds, and possibly thousands of criticisms which have been made in the last ten years of this book, it can safely be said that 75 per cent. of these are worthless. This is due to various reasons. One man writes that the process for solution of ferric chloride is defective, because it produces a blackish turbid liquid. The operator has used nitric acid not up to the official requirement, or he has heated it too strongly and evaporated a portion of it, so that there has not been sufficient left to convert all of the ferrous salt into the ferric modification, and ferrosoferric chloride has been produced. Another man writes that the formula for tincture of calumba won't work; it becomes clogged in the percolator. Investigation shows that he had a stock of finely powdered calumba root, and disregarded the official direction to use No. 20 powder; and so it goes. Some detail of the process has usually been overlooked or considered unnecessary, and the habit of deviating from the strict letter of the Pharmacopœia is one which grows rapidly.

Then, again, some druggist believes that wood alcohol is just as good for making many of the preparations, and is much cheaper, and he thinks that the rules of the Pharmacopœia are not binding; it has only been lately that it has been shown that wood alcohol, when taken internally, will cause blindness. Some druggists find that laudanum made by the official process uses up too much opium,

and that customers prefer the kind made of the strength of one ounce in the gallon, and besides it is cheaper. It is needless to refer in extenso to the various excuses which are given for not adhering to the Pharmacopœia. But it may be said, "Has not the advance in pharmaceutical knowledge shown that many improvements can be made in the processes, and can I not take advantage of these improvements?" The answer which can be made to this is, that first it must be proved absolutely that it is an improvement, and produces a finished product identical with that of the Pharmacopœia, for physicians have a right to demand that official preparations must be uniform throughout the country. It cannot be urged with propriety that a so-called "improved" preparation *is made* according to the U.S. Pharmacopœia; but of course, if it is not claimed to be made according to the Pharmacopœia, or dispensed or sold as such, and the doctor or customer is not misled, there can be no fault found with the procedure. But the writer earnestly deprecates the habit which many fall into of systematically replacing and cheapening pharmacopœial products, and defending this course of action by various excuses which are often absurd and irrational, when the real reason is that a greater profit is made by such deviations from this standard.

The query is therefore answered by saying that pharmacists, in making official preparations, should always follow out the rules laid down in the Pharmacopœia, exceptions being made only where some error has been found, which renders the following out of the rule an impossibility.

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## THE TREATMENT OF CONTUSIONS AND WOUNDS BY THE APOTHECARY.<sup>1</sup>

BY CLEMENT B. LOWE.

It is hardly necessary to argue the question whether this work should be done by the apothecary or not. Suffice it to say that there are times when it will be thrust upon him by the absence of the physician. If he is competent to do this work in an intelligent manner his reputation will be greatly enhanced thereby.

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<sup>1</sup> Read at the annual meeting of the Pennsylvania Pharmaceutical Association, June, 1902

Contusions or bruises are injuries generally caused by some blunt instrument, *e.g.*, a stone, club or fist. There is more or less destruction of tissue followed by swelling, subcutaneous hemorrhage and frequently discoloration. The treatment is, first, to prevent any further escape of blood in the tissues; this may be effected either by cold or hot applications, both of which ultimately reduce the calibre of the bloodvessels. If ice is used it should not be applied for too great a length of time, as the circulation may be interfered with to so great an extent as to injure the vitality of the part. Secondly, to antagonize the pain, shock or inflammation. This may be done by rest, elevation and cold, as already alluded to. In severe cases warmth would probably be more agreeable and safer. After the inflammatory stage, absorption may be promoted by massage or friction with liniments. It may be said in passing that the best methods of treating a sprain is to keep the injured part (which is generally an ankle) immersed in water as hot as it can possibly be borne for some three hours. Ammonium chloride (8 ounces to a bucketful of water) is a valuable adjunct.

The wounds that the apothecary will be most apt to see are the incised, generally caused by some sharp instrument, such as a knife or razor; the lacerated, in which the tissues are more or less torn, as a scalp wound; and wounds produced by animals, usually dogs.

In the case of incised wounds, if they are properly treated and the edges of the wounds closely approximated, healing always takes place by what is called "union by first intention," frequently in seventy-two hours. In the case of lacerated wounds, healing takes place more slowly by granulation; that is, the formation of new material from the bottom of the wound called "union by second intention."

It is hardly necessary at this late day to argue in favor of the antiseptic treatment of wounds, but it should be said, and said as strongly as possible, that any apothecary who is not willing to go to the trouble to treat wounds in this way should not treat them at all.

The following articles will be needed for the antiseptic treatment of wounds, unless they are of a very trivial nature: Solution corrosive sublimate, 1:1000 or 1:2000. In deep-seated or extensive wounds weaker solutions must be used, or there will be danger of poisoning; but it must be borne in mind that in the drug store where perfect antisepsis cannot be attained, fairly strong solutions

had best be used. Solution carbolic acid (carbolic acid 15j, glycerin 15j, mix thoroughly and add water 15xxxviiij), corrosive sublimate or iodoform gauze, oil-silk, iodol, iodoform or thymol iodide, absorbent cotton, bandages for fingers  $\frac{3}{4}$  inches x 1 yard, for extremities 2 to 3 inches x 8 yards, for the body 4 inches x 12 yards, for the head 2 to 2½ inches x 6 yards, sponges (absorbent cotton can often be used in place of the latter in minor surgery), scissors (one pair curved on the flat for cutting hair from the scalp), needles (those curved on the point being the most useful), forceps for inserting the needles, silk for sutures, a clean towel (not the ordinary drug-store towel), fountain syringe, and basins (porcelain lined).

#### METHOD OF PROCEDURE IN TREATING WOUNDS.

(1) Wash hands thoroughly and dry them on a perfectly clean towel, (2) prepare antiseptic solutions, (3) put instruments, oil-silk and needles threaded in carbolic solution, (4) cleanse wound thoroughly by solution corrosive sublimate and fountain syringe, (5) in case of scalp wounds first remove the hair, (6) if wound gaps, approximate the edges by oxide of zinc plaster or by suturing. In putting in a suture, grasp the needle firmly, introduce it into the flesh, taking a good hold, and bring it out the other side. Sutures may be of the interrupted or the continuous type. After the several threads are introduced, the edges of the wound are pulled together and each thread is tied in a reef or surgeon's knot, the knots being pulled to one side over the sound flesh, then one end is cut and one left long, to be used in pulling out the stitches after the wound has healed.

After the wound has been sewed, it should again be cleansed by the antiseptic solution, then the oil-silk (previously rendered aseptic) should be applied, then the medicated gauze, absorbent cotton and bandages, the part thus being placed at rest. The oil-silk is applied directly to the wound, so that the new tissue which is formed will not become adherent to the dressing and be torn up when the dressing is removed.

The treatment of a lacerated wound is about the same, with the exception that there is usually considerable destruction of tissue, which must be trimmed away; on account of the dirt which is apt to be ground into such a wound it should be very carefully cleansed. Before applying the dressing to the wound, it should be dusted with



iodoform, etc.; this is not done in an incised wound, as it would prevent the approximation of the edges of the wound.

In the case of a wound caused by the bite of an animal it should be cauterized by nitric acid. Nitrate of silver is worse than useless, because, through the formation of an albuminate of silver, its action is greatly limited, and the caustic may not penetrate to the bottom of the wound; in fact, some of the poison may be locked up at the bottom. Sulphuric and phosphoric acids, through their affinity for water, are unnecessarily severe. Popular superstition demands the killing of a dog at once to prevent his victim from acquiring hydrophobia; this is decidedly unwise, as it prevents a decision as to the dog being rabid; the dog should be securely chained but not killed. Those wounds which the druggist will be called to treat will not need to be redressed inside of three days, and in many cases a week may be allowed to intervene.

Some of you may object to antiseptic surgery on account of the close attention which must be given to details, but in actual practice these are not burdensome, and the knowledge once acquired becomes a mere routine. By no other treatment can you assure your patient of the speedy healing of a wound without unpleasant complications. In conclusion, let me say that the laborer is worthy of his hire. If you perform your work in a first-class manner, you should charge a first-class price for it. Don't cut the ground from under the physician's feet by charging only a nominal fee.

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## GASOMETRIC ANALYSIS.<sup>1</sup>

BY FRANK X. MOERK.

Two years ago the writer presented before this association a paper on gasometric analysis, in which a simple and inexpensive apparatus was described which had given very satisfactory results. For those estimations, as in the case of the nitrites, in which all air has to be removed from the apparatus in order to obtain correct results, the former paper contains the necessary details, and no change has been suggested; on the other hand, for the estimation of urea, hydrogen dioxide and, particularly, for the estimation of the substances to be

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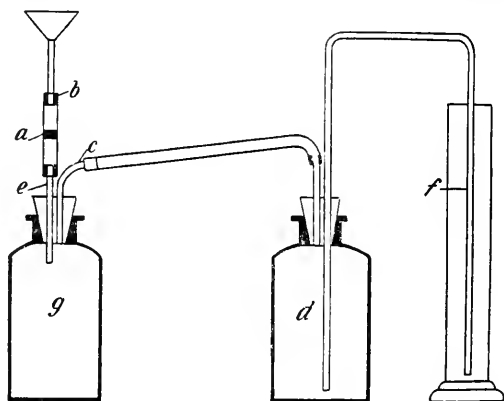
<sup>1</sup> Read at the annual meeting of the Pennsylvania Pharmaceutical Association, June, 1902.

described in this paper, the use of the homeo-vial had been found a source of more or less trouble, and this has been superseded by transferring the funnel-tube from the reservoir *d* to the generator *g*. The illustration will clearly show the new arrangement.

A piece of iron wire, sharpened at one end, is stuck into the cork, the other end is bent into a circle so as to support the funnel. Attention is directed to the following points to prevent likely sources of error:

(1) The small tube *e*, to which the funnel-tube is attached, should project about  $\frac{1}{2}$  inch below the lower surface of the cork, otherwise it may happen that in allowing liquids to enter through this tube some may be carried along the cork and escape into the exit tube *c*, causing loss.

(2) The following order, in preparing for a determination, should



Apparatus for Gasometric Analysis.

be observed: Disconnect apparatus at *c* and remove stopper from *g*; charge the generator *g* with the specified materials; adjust the funnel-tube by filling the funnel with the proper liquid and, by compressing the rubber tubing at the position of the small glass plug *a*, allow the liquid to fill the small sections of rubber and glass tubing and displace the air (when this has been accomplished allow the liquid to drop from the glass tube until the liquid in the funnel is on a level with the upper end of the rubber tubing *b*); replace the cork in the generator; fill the reservoir *d* with water after removing the stopper, replace the latter and place the outer end of the siphon-tube *f* into a vessel containing water; by applying suction at *c* this

siphon-tube can and must be perfectly filled with water, although it is not necessary to have *d* perfectly filled; connect the two bottles at *c* and remove the siphon-tube from the vessel containing water; see that the apparatus does not leak by watching the siphon-tube; should this, by a slow dropping of water, indicate a leak, this can generally be stopped by pouring a little water over the corks; place the siphon-tube in the vessel used to collect or measure the water displaced by the gas evolved in the experiment; if this vessel is graduated it should be dry at the beginning of the experiment; if, on the other hand, it is not graduated, rinse it with a little water and allow to drain before using. By this precaution the quantity of water used to moisten the vessel, and which would be lost in transferring to a graduated vessel, is first added.

(3) In handling the apparatus, as in connecting and agitating, hold the bottles at the lip, so as to take advantage of the thickest portion of the glass as a nonconductor of heat, and prevent expansion of the air or gas by the heat of the hand.

(4) After the apparatus has been adjusted and prepared for a determination, a record must be kept of the liquids allowed to enter through the funnel-tube, and this volume subtracted from the volume of the displaced water to obtain the volume of the evolved gas; it is, therefore, important, in introducing a definite quantity of solution, to see that there is still the same quantity of liquid in the funnel-tube as at the beginning of the determination; should the liquid go below the adjustment at *b*, more than the intended quantity of liquid will enter. In agitating after the addition of the reacting substances, this should not be so violent as to throw the liquid in *g* against the cork, because some of the liquid escaping through *c* into *d* will be so diluted by the water as to stop the reaction, and some of the liquid in the funnel-tube will react with the material in *g* (one of these entails loss of reacting substance, the other increases the same).

*Estimation of Urea.*—Place 40 c.c. Labarraque's Solution in generator *g*; adjust the funnel-tube with urine. Add 4 c.c. urine through funnel-tube; agitate until effervescence ceases and allow to stand 10 to 15 minutes; measure the displaced water, subtract 4 c.c. and multiply remainder by 0.002686 for the quantity of urea in 4 c.c. To obtain the percentage, multiply the number of cubic centimeters of urine taken by the specific gravity, then the resulting weight of urine taken : weight of urea found  $\div 100 = x$ .

No correction is applied for the volume of gas being under other than normal conditions, for the reason that in the decomposition of urea there is involved a loss of about 9 per cent. nitrogen, and this loss is just about balanced by the effect of temperature, pressure and tension of aqueous vapor under ordinary conditions.

In the following estimations in which oxygen is evolved, a correction has to be made for the increase in volume of the gas through the influence of temperature and the tension of aqueous vapor. The following table is taken from the previous paper:

Temperature.	For Exact Correction, Volume of Gas is Divided by	For Approximate Correction, Subtract from Volume of Gas.	Error of Approximate Correction. Per Cent.
10° C.	1.0488	$\frac{1}{32}$	+ 0.11
15° C.	1.0719	$\frac{1}{15}$	+ 0.05
20° C.	1.0967	$\frac{1}{11}$	- 0.30
25° C.	1.1236	$\frac{1}{9}$	- 0.12
30° C.	1.1533	$\frac{1}{6}$ and add $\frac{1}{100}$	- 0.16
35° C.	1.1866	$\frac{1}{6}$ and add $\frac{1}{100}$	- 0.13
40° C.	1.2245	$\frac{1}{5}$ and add $\frac{1}{50}$	- 0.09

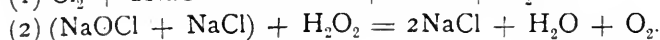
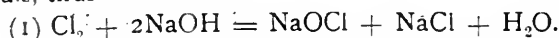
  

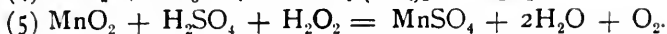
1 c.c. oxygen under normal conditions is equivalent to . . . . .	$\left\{ \begin{array}{l} 0.0030385 \text{ H}_2\text{O}_2 \\ 0.0031684 \text{ Cl} \\ 0.0038841 \text{ MnO}_2 \\ 0.0075613 \text{ BaO}_2 \end{array} \right.$
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*Estimation of Hydrogen Dioxide.*—Place 10 to 20 c.c. of a saturated solution of potassium bichromate in generator; adjust funnel-tube with hydrogen dioxide. Add 5 c.c. hydrogen dioxide through funnel-tube; agitate and allow to stand until the solution in the generator assumes its original color. Example: 67 c.c. water displaced less 5 c.c. liquid added through funnel-tube gives 62 c.c. gas at 25° C. or 55.12 c.c. corrected;  $55.12 \div 5$  (c.c.  $\text{H}_2\text{O}_2$  used) = 11.02 volume or  $55.12 \times 0.0030385 = 0.15557 \text{ H}_2\text{O}_2$  in 5 c.c. or 3.349 per cent.

As the potassium bichromate suffers no permanent change in this estimation, quite a number of determinations of the same  $\text{H}_2\text{O}_2$  can be made by simply filling up the reservoir again, as the water in this runs low, before adding the next portion of  $\text{H}_2\text{O}_2$  through the funnel-tube.

The following determinations are made possible by the ready decomposition of hydrogen dioxide in the presence of other chemicals, thus we have:





The strength of the hydrogen dioxide is not material, providing a sufficient quantity be used; this is best determined by making a gasometric estimation of the sample of  $\text{H}_2\text{O}_2$  to be used. The quantity of gas evolved should exceed that evolved in the estimations of available chlorine in chlorine water, chlorinated lime and Labarraque's solution; in the estimations of manganese dioxide and barium and dioxide one-half of the evolved gas is to be compared with the volume evolved from the  $\text{H}_2\text{O}_2$ .

#### AVAILABLE CHLORINE ESTIMATIONS.

*In Chlorine Water.*—Place 5 c.c. solution of soda (5 per cent.) and 20 c.c. chlorine water in generator; adjust funnel-tube with  $\text{H}_2\text{O}_2$ . Add 5 c.c.  $\text{H}_2\text{O}_2$  through funnel-tube as rapidly as possible, agitate the generator for a few seconds only, and as soon as the dropping of the displaced water ceases (the apparatus for the determination of available chlorine should be raised so that the end of the siphon-tube will not be immersed in the displaced water), measure the displaced water. After standing less than two minutes a slow decomposition of the excess of  $\text{H}_2\text{O}_2$  commences, which is to be disregarded.

An old specimen of chlorine water by volumetric titration gave 0.0669 per cent.; by the gasometric method 0.062, 0.069 and 0.0655 per cent; a more recent specimen 0.17 per cent. by titration, against 0.179, 0.172 and 0.172 per cent. by gasometric method.

*In Solution of Chlorinated Soda.*—Place 5 c.c. Labarraque's solution and 5 c.c.  $\text{H}_2\text{O}$  in the generator; adjust funnel-tube with  $\text{H}_2\text{O}_2$ . Add 5 c.c.  $\text{H}_2\text{O}_2$  and proceed as under *chlorine water*.

With a specimen (sp. gr. 1.050) 1.10 per cent. available chlorine was found against 1.094 per cent. by volumetric titration.

*In Chlorinated Lime.*—This substance varying considerably in strength in different portions of the same lot, about 2 grammes are to be weighted off after mixing, triturated in a mortar with water and finally made up to 100 c.c. Place 10 c.c. of this turbid mixture in the generator; adjust the funnel-tube with  $\text{H}_2\text{O}_2$ . Add 5 c.c.  $\text{H}_2\text{O}_2$  and proceed as under *chlorine water*.

1.8352 grammes treated as above gave uniformly 30.07 per cent. against 30.08 per cent. by volumetric titration.

*Estimation of Manganese Dioxide.*—This substance should be finely powdered to facilitate the reaction. 0.2 — 0.3 gramme are placed in the generator along with 10 c.c. diluted  $\text{H}_2\text{SO}_4$  (if the sample contains carbonates allow the effervescence to cease before proceeding); adjust funnel-tube with  $\text{H}_2\text{O}_2$ . Add 5 c.c.  $\text{H}_2\text{O}_2$  through the funnel-tube and agitate repeatedly until all black particles disappear and effervescence ceases.

0.3404	gramme of a specimen	liberated	56.43	c.c. gas	corrected	=	64.39	per cent.
0.3164	"	"	"	"	52.45	"	"	" = 64.39 "
0.2226	"	"	"	"	36.89	"	"	" = 64.37 "

By a volumetric titration 64.40 and 64.52 per cent. were obtained.

*Estimation of Barium Dioxide.*—Thoroughly mix the sample and weigh off about 2 grammes; add 10 c.c.  $\text{H}_2\text{O}$  and then sufficient of a cooled mixture of 10 c.c.  $\text{H}_3\text{PO}_4$  and 30 c.c.  $\text{H}_2\text{O}$  to make 50 c.c. Place about 0.5 gramme manganese dioxide and 10 c.c. diluted  $\text{H}_2\text{SO}_4$  in the generator (if there is any effervescence wait until it ceases before proceeding); adjust funnel-tube with water. Add 5 c.c. of the barium dioxide, or rather hydrogen dioxide solution prepared from the barium dioxide, through the funnel-tube; follow this with 10 c.c. water to perfectly rinse the former solution into the generator; agitate repeatedly until effervescence ceases. Subtract 15 c.c. from the volume of water displaced. 2.7352 grammes dissolved as above gave 85.28, 85.75, 86.75, 85.75, 87.96, 87.71 and 86.99 per cent. Volumetric titration before and after the above determinations gave 86.22 per cent. The varying figures are easily explained when it is remembered that for the strength of solution used, an error of 1 c.c. in reading the volume of displaced water is equivalent to 2.76 per cent.

In conclusion the writer would state that the object of this paper is to show the pharmacist that it is not essential to have a well-equipped laboratory in order to do a little experimenting; and I venture to say that one taking up for instance the hydrogen dioxide assay will become interested in this little apparatus and take up some of the other determinations.

## ADULTERATED ASAFETIDA.<sup>1</sup>

BY CHARLES H. LAWALL.

Asafetida is a drug which is used as an antispasmodic medicinally in this country, and as condiment in the far East. The source of supply comes from Persia, Afghanistan and Turkestan, and by far the largest consumption of it occurs in India, where the Mohammedan population and the vegetarian Hindoo classes use it lavishly in sauces to give their food a relish.

In India the two grades, which occur on the market, are known respectively as "Hing," which is the better grade, and "Hingra," which is the poorer grade. From the state of the American market at the present time it certainly appears as if all the "Hingra" came to this country, there being little or no material that might be said to be of "prime" quality.

The requirements of the U. S. Pharmacopœia call for 60 per cent. of alcohol-soluble material. That these requirements are excessively high has been shown by the protest which has been registered in recent years against the requirement, which is so high as to be impracticable to comply with.

John Uri Lloyd, in the *Pharmaceutical Review*, for March, 1896, called attention to this, and reported having examined six samples, only one of which came up to the U.S.P. requirement.

Mr. Umney, in the *Chemist and Druggist*, for December 16, 1899, complained similarly regarding the requirements of the British Pharmacopœia, which are even higher than the U.S.P., the former requiring 65 per cent. soluble matter.

In the *Journal for the Society of Chemical Industry*, for 1900, page 981, Russell W. Moore reports that the quality of the asafetida on the market has improved wonderfully during the last decade, and quotes figures in support of this claim. He shows that out of 164 samples examined in 1890, only 6 showed a percentage of alcohol-soluble material over 50 per cent.; while out of 150 samples examined in 1900, 71 of the samples contained 50 per cent. or over of alcohol-soluble material. The standard of 50 per cent. was taken by him because the U. S. Treasury regulations, which are usually based on the Pharmacopœia as a standard, allow a deviation of 10

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<sup>1</sup> Read at the annual meeting of the Pennsylvania Pharmaceutical Association, June, 1902.

per cent. from this standard in the case of asafetida; that is, the Treasury Department is supposed to reject and refuse importation to all asafetida which contains less than 50 per cent. of alcohol-soluble material.

In the *AMERICAN JOURNAL OF PHARMACY*, for March, 1901, M. I. Wilbert published an article on this same subject, of the quality of commercial asafetida, in which he showed that most of the samples examined were far below even 50 per cent., and that price was no indication whatever of quality; the price of the best sample he examined being somewhat less than the price of the poorest sample.

During the past spring the author had occasion to examine samples of asafetida which were taken from 46 cases, which was held up by the custom authorities as being below the Treasury requirements. The custom authorities referred to are those of the port of Philadelphia. The cases were carefully sampled and the samples thoroughly mixed. This material was of prime appearance and would pass anywhere for first-class asafetida; but upon estimating the alcohol-soluble material it was found to fall below 33 per cent.

In consequence of this deficiency in quality, the entire lot was prevented from coming into this port and was sent back to Europe to be sold there. Other samples were obtained, and a selection made from them, when it was found that the best-appearing sample submitted showed a percentage of only 30 per cent. alcohol-soluble material. The only specimen which has come under the author's notice recently, which has exceeded 50 per cent. soluble material, was a small lot which had been held by the seller for at least a dozen years, which was badly discolored from having been through a fire, and which had nothing to do at all with the present market supply.

Investigations are being made now, which cannot be reported at this time, regarding the status of all the asafetida on the American market at the present time. The question before the author's mind at the present moment is: How does the poor asafetida get into the New York and other markets, if the custom authorities of the port of Philadelphia are so strict as to reject it when below 50 per cent., and when one can turn round and purchase elsewhere material which contains less soluble matter than that rejected in Philadelphia? Surely there is a laxity somewhere in enforcing the Custom House regulations which should be looked after.



## WILLIAM MARTINDALE—PHARMACIST.

BY E. H. GANE.

By the death of William Martindale, which occurred at his home in London, in February last, pharmacy has lost one of its leading exponents.

William Martindale was born in 1840, near Carlisle, in which city he received his early education and served his apprenticeship to the drug business with the late Mr. Andrew Thompson. In 1862 he went to London and, after attending a course of lectures at the School of Pharmacy in Bloomsbury Square and qualifying as a pharmaceutical chemist, he became an assistant in the old-established house of Thomas Morson & Son, of Southampton Row. This firm he left in 1868 to take up an appointment as dispenser and teacher of pharmacy at University College Hospital. In 1872 he was appointed one of the Board of Examiners to the Pharmaceutical Society of Great Britain, retaining this appointment until 1882.

The most important part of his career commenced in 1883, when he took over the retail store of Messrs. Hopkin & Williams, at 10 New Cavendish Street, W., which place has since become a pharmaceutical Mecca for the British Empire. In 1889 Mr. Martindale was elected to the Council of the Pharmaceutical Society, and the esteem in which he was held by his confrères is shown by the fact that he was usually returned to the Council at the head of the poll. His colleagues upon the Council elected him treasurer in 1898, and in the following year he was elected to the presidency of the Pharmaceutical Society of Great Britain, succeeding Mr. Walter Hills. Unfortunately, about this time ill-health supervened and he was compelled to take frequent periods of change and rest. Even during these periods he was not idle, as the sea voyages which he took for the benefit of his health led to investigations upon the *materia medica* of the countries visited, with subsequent contributions either to the Pharmaceutical Society's meetings or to the trade publications.

Mr. Martindale early took an interest in the meetings of the British Pharmaceutical Conference. Elected in 1869, he was soon appointed to the Executive Committee, and in 1886 became Chairman of its Formulary Committee, which post he held for many

years. He was twice elected to the presidency of that body and did much to make its meetings a success. He was also a Fellow of the Chemical and Linnean Societies and of the Society of Arts, and incidentally found time to devote to archeological studies and to municipal affairs, being Mayor of Winchelsea, in which town he had a country residence, and became, by virtue of this office, a "Baron" of the Cinque Ports. His work was recognized by the Government, which appointed him a member of the Committee of the Privy Council, which was engaged in considering the subject of the regulation of the sale of poisons, and only the day before his death he was engaged upon the work of this committee.

Among British pharmacists William Martindale was, as one of his colleagues aptly said, "*facile princeps*." While his name is known to pharmacists the world over, probably few outside of England could point out upon just what his reputation was based. His contributions to pharmaceutical literature were by no means voluminous nor yet of high scientific import. His strength lay in his devotion to the art of pharmacy *per se*, and in his eminently practical character. The keynote to his reputation is perhaps best shown by mention of his first paper contributed to the Pharmaceutical Society in 1868. It was entitled "Carbolic Acid Plaster," and was read at a time when Lister was attracting attention by his advocacy of the antiseptic treatment of wounds. Thereafter followed a long series of notes and papers devoted almost entirely to the problems which confronted the pharmacist in his everyday work. Much of this work seems to-day to be of a very simple character, but it was of immense value to dispensers at that date, and many of the methods which are in daily use at the present time, while not specifically identified with Mr. Martindale's name, are nevertheless the result of his painstaking devotion to the detail work of the pharmacy. Mr. Martindale was fortunate in the location of his store, being brought into close touch with the leading practitioners of Great Britain, and thus being among the first to meet and solve the problems which the advance in medical science is constantly bringing before pharmacists. Herein lay the secret of his popularity among his confrères in that he was always willing to impart to them the results of his own experience.

Much of this is embodied in the "Extra Pharmacopœia," a work which he first published in 1883 in conjunction with Dr. Wynn

Westcott. Since that date the work has gone through ten editions, increasing in value and usefulness, so that to-day there are few stores in the British Empire in which the "Extra Pharmacopœia" is not in almost daily requirement. Even among the best American pharmacists the book is held in high esteem. Another little work on "Coca and Cocaine," published some fifteen years ago, ran through several editions, and was of great value to pharmacists at the time when the excitement over the discovery of cocaine was at its height.

Mr. Martindale, personally, was a man of high character and kindly disposition. He was a tireless worker, and while at times hasty, he was nevertheless always prompt to make amends. To students he was always willing to impart advice and information, and many a candidate during the trying ordeal of the examination-room will remember the kindly manner in which he would try to set him at ease. While not a fluent speaker, he was always a welcome one, and generally managed to leave his audience with an Oliver-Twist desire for more. His successful business career is a striking example of the possibilities of devotion to the art of pharmacy, and his untimely end leaves a gap in the ranks of pharmacy which will not soon be filled.

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## EDITORIAL.

### THE AMERICAN PHARMACEUTICAL ASSOCIATION.

As the annual meeting of the American Pharmaceutical Association, to be held in Philadelphia, beginning Monday, September 8, 1902, will be the semi-centennial meeting of the Association, it may be of interest to refer to some of the features connected with its organization, at this time, as well as to its development, and the features of the coming meeting.

At the second session of the convention of the pharmacutists and druggists of New York, Philadelphia and Boston, in New York City on October 16, 1851, the following resolution was adopted.

"*Resolved*, That a convention be called consisting of three delegates each from incorporated and unincorporated pharmaceutical societies to meet at Philadelphia on the first Wednesday of October, 1852, when all the important questions bearing on the profession may be considered, and measures adopted for the organization of a National Association to meet every year."

The convention met at Philadelphia, October 6, 1852, in compliance with the above resolution, and on October 7th adopted a constitution and code of ethics. The earlier proceedings contained less than fifty pages, and are interesting in a number of respects. Among other things, two prizes were offered consisting (1) of twenty-three volumes of the *AMERICAN JOURNAL OF PHARMACY*, and (2) six volumes of Gmelin's *Handbook of Chemistry*.

The Association has grown to a membership of more than 1,200, publishes an annual volume of more than 1,000 pages, has a life membership fund of more than \$12,000, a centennial fund of over \$1,200, the interest of which is "used for defraying the expenses incurred in conducting original investigations in pharmacy or an allied science," and offers eight prizes for original investigations and papers.

The meeting in September promises much for pharmacy and pharmacists. All those interested in pharmacy and who can possibly arrange to attend should be present. The following pharmacists who joined the Association during or prior to 1860 are expected to attend:

Henry Thornton Cummings, Tacoma, Wash.; Geo. Luther Dearborn, New Market, N. H.; William Wells Goodwin, Newburyport, Mass.; William John Maclester Gordon, Cincinnati, O.; Alpheus Phineas Sharp, Baltimore, Md.; Robert Restieaux Kent, New York City; Thomas Roberts Baker, Richmond, Va.; Philip Charles Candidus, Mobile, Ala.; Evan Tyson Ellis, Philadelphia, Pa.; Edwin Oscar Gale, Chicago, Ill.; William Henry Gale, Chicago, Ill.; Edward Hance Hance, Philadelphia, Pa.; Henry Haviland, Brooklyn, N. Y.; William Huntington Peabody, Brooklyn, N. Y.; Thomas Morris Perot, Philadelphia, Pa.; Henry Norman Rittenhouse, Philadelphia, Pa.; George White Sloan, Indianapolis, Ind.; Thomas Snowden Wiegand, Philadelphia, Pa.; Joseph Augustus Heintzelman, Philadelphia, Pa.; William Jenks Jenks, Philadelphia, Pa.; Jos. Lyon Lemberger, Lebanon, Pa.; Edward Leon Milhau, New York City; Ichabod Bartlett Patton, Boston, Mass.; Dr. Enno Sander, St. Louis, Mo.; William Beatty Thompson, Philadelphia, Pa.; Louis Dohme, Baltimore, Md.; Thomas Doliber, Boston, Mass.; Henry Alexander Elliott, Baltimore, Md.; John Ferdinand Grossklaus, Navarre, N. D.; Noah Sparhawk Harlow, Bangor, Me.; James Theodore King, Middletown, N. Y.; Robert Henry Land, Augusta,

Ga.; George Moore, Somersworth, N. H.; Joel Stone Orne, Cambridgeport, Mass.; John Francis Rollins, Dover, N. H.; James Gurden Steele, Cordelia, Cal.; Henry Martin Whitney, North Andover Depot, Mass.; Benjamin Osgood Wilson, Boston, Mass.; John Ransom Drake, Milwaukee, Wis.; Christian Fried. Gottlieb Meyer, St. Louis, Mo.; Augustus Theodore Moith, Fishkill-on-Hudson, N. Y.; Joachim Bonaparte Moore, Philadelphia, Pa.; Richard John Owens, Brooklyn, N. Y.; Henry McEwen Pettit, Carrollton, Mo.; William Saunders, Ottawa, Can.; Giles Green Craycroft Simms, Washington, D. C.; James Thomlin Shinn, Philadelphia, Pa.; and Benj. Franklin Stacey, Charlestown, Mass.

The following ex-presidents of the Association have promised to be in attendance:

J. W. M. Gordon, Cincinnati, O. (1864); Frederick Stearns, Detroit, Mich. (1866); E. H. Sargent, Chicago, Ill. (1869); Enno Sander, St. Louis, Mo. (1871); Albert E. Ebert, Chicago, Ill. (1872); John F. Hancock, Baltimore, Md. (1873); C. Lewis Diehl, Louisville, Ky. (1874); Wm. Saunders, Ottawa, Can. (1877); Geo. W. Sloan, Indianapolis, Ind. (1879); James T. Shinn, Philadelphia, Pa. (1880); John Uri Lloyd, Cincinnati, O. (1887); A. K. Finlay, New Orleans, La. (1891); Joseph P. Remington, Philadelphia, Pa. (1892); Edgar L. Patch, Stoneham, Mass. (1893); Wm. Simpson, Raleigh, N. C. (1894); James M. Good, St. Louis, Mo. (1895); Joseph E. Morrison, Montreal, Can. (1896); Henry M. Whitney, North Andover Depot, Mass. (1897); Charles E. Dohme, Baltimore, Md. (1898); Albert B. Prescott, Ann Arbor, Mich. (1899), and John F. Patton, York, Pa. (1900).

The Permanent Secretary, Professor Caspari, writes that Mr. G. Claridge Druce, president and Mr. N. H. Martin, vice-president of the British Pharmaceutical Conference will come over to represent that body at our Jubilee Meeting.

The following provisional program has been arranged:

Monday, September 8th.—9.30 A.M., Meeting of the Council; 3 P.M., First General Session; 8 P.M., Reception at Horticultural Hall tendered to the delegates and ladies. •

Tuesday, September 9th.—10 A.M., Second General Session; in the afternoon, visits to places of interest; 3 P.M., Meeting of Section on Commercial Interests.

Wednesday, September 10th.—10 A.M., Session devoted to dis-

cussion of exhibits; 2.30 P.M., drive through Fairmount Park along the banks of the Schuylkill and Wissahickon to Chestnut Hill, returning by trolley cars through Germantown; 8 P.M., First Session of Section on Scientific Papers.

Thursday, September 11th.—10 A.M., Second Session of the Section on Scientific Papers; 3 P.M., Golden Jubilee Meeting; 8.30 P.M., Jubilee Banquet.

Friday, September 12th.—9.30 A.M., Session of Section on Practical Pharmacy and Dispensing; 1.30 P.M., Steamboat Excursion and Lunch on the Delaware River, tendered by the Philadelphia Association of Retail Druggists; 8 P.M., Third Session of the Section on Scientific Papers.

Saturday, September 13th.—10 A.M., First Session of the Section on Education and Legislation; 3 P.M., proposed Excursion of Delegates to Atlantic City, returning Monday morning.

Monday, September 15th.—10 A.M., Second Session of Section on Education and Legislation; 3 P.M., Last General Session.

Tuesday, September 16th, to Monday, September 22d, will be devoted to social sessions and special committee meetings.

The officers of the various sections are doing all that they can to make the work in their respective sections of benefit to those in attendance.

The officers of the *Scientific Section* are arranging for an interesting program. Papers will be received from two of the honorary members of the Association, viz., Prof. E. Schmidt, of Marburg, and Prof. E. Schaer, of Strassburg. It is extremely desirable that all those having papers in preparation, notify as soon as possible the Chairman, Lyman F. Kebler, or the Secretary, Joseph W. England, 35 Poplar Street, Philadelphia. Papers to be printed in advance of the meeting should be received on or before August 12th.

The Special Committee on Drug Market, the chairman of which is E. L. Patch, Boston, Mass., will make its report to this section. This committee was appointed to report all variations from pharmacopœial or other recognized standards, either in quality, description, solubility, fusing point, etc., discovered by published statement in any medical or pharmaceutical journal, or by personal examination by any member of the committee. Such data should be of value to subsequent Committees of Revision of the U.S.P.,

and should show to manufacturers and dealers the desirability of a closer approach in quality to the advertised claims.

It is well known that not a few chemical products are marketed below the official standard, and it is impossible for the pharmacist to obtain a quality that will exempt him from breaking the health laws that adopt the Pharmacopœia as a standard. The use of the terms "pure," "purified," "chemically pure" is very loose in the ordinary channels of trade and in many cases is meaningless. The buyer assumes that they have a positive significance when they may have a relative meaning only. A systematic examination and statement of this condition should be of practical benefit to pharmacy and medicine.

In the *Section on Education and Legislation* papers are expected giving the progress in these fields during the past fifty years in this country. Brief papers relating to interesting questions during their respective terms of office will be read by all the living ex-presidents of the Association. The special committee appointed by the Association to look into the matter of the acquirement of drug habits, of which the chairman is H. P. Hynson, Baltimore, Md., will make an interesting report with practical recommendations to this section. Various other subjects, as methods of teaching and the extension of the curriculum in colleges, will be considered. Papers or titles should be sent as soon as possible to either the Chairman, E. G. Eberle, Dallas, Tex., or the Secretary, J. W. T. Knox, Detroit, Mich.

The officers of the *Section on Practical Pharmacy and Dispensing* are likely to receive a liberal number of papers in response to the list of suggestions sent out by the committee in the early part of the year. Indeed, the Council has been asked to make some provision for holding two sessions of the section instead of only one, as provided in the by-laws. Besides the discussion of prescription difficulties and notes on dispensing, the committee expects to have several papers relating to pharmacy and dispensing as practised fifty years ago. Papers should be sent to either the Chairman, George W. Sloan, Indianapolis, Ind., or to the Secretary, Wm. F. Kaemmerer, Columbus, O.

The *Committee on Exhibits* has arranged for an unusual exhibition of rare, curious and interesting relics that relate to pharmacy and which will serve to illustrate the advance made in the profes-

sion during the last fifty years or more. Manufacturers, pharmacists and members of some of the colleges have contributed much interesting material, and the committee has taken care to exclude all exhibits that might lead to fault-finding by the most critical visitor. The chairman of this committee is Thomas P. Cook, 114 William Street, New York City.

At the St. Louis meeting, Professor Caspari offered a resolution: "that at the next annual meeting of this Association, in 1902, a special jubilee session be held to commemorate the fiftieth anniversary of its organization, and that Dr. Frederick Hoffmann, of Berlin, Germany, be invited to preside over this session and to deliver the address of the occasion." A special committee has been appointed to look after this jubilee session and is arranging for an interesting program on Thursday afternoon, September 10th. The committee also proposes to have a special commemorative exhibit, and it is proposed to make this of a dual character—one section to illustrate the advance in the practice of pharmacy and pharmaceutical manufactures. And in this connection will be exhibited interesting relics, old apparatus, obsolete or old drugs and methods of manipulation. The other section will exhibit the advances made in pharmaceutical literature and education, the pharmaceutical and allied works of members of the American Pharmaceutical Association, books relating to pharmacy, certificates, medals, diplomas, portraits of officers and illustrious pharmacists, etc.

Materials donated or loaned should be sent to the Committee on Semi-Centennial Celebration, George M. Beringer, Chairman, in care of Philadelphia College of Pharmacy, not later than August 20th, that they may properly arrange and catalogue this exhibit.

The Association has a standing *Committee on Transportation*, which is appointed by the Council, and consists of the following members: Charles Caspari, Jr. (Chairman), Baltimore, Md.; Albert E. Ebert, Chicago, Ill.; Caswell A. Mayo, New York, N. Y.; Charles M. Ford, Denver, Col.; Charles G. Merrell, Cincinnati, O.; S. A. D. Shepard, Boston, Mass.; George F. Payne, Atlanta, Ga.; H. M. Whelpley, St. Louis, Mo.; William M. Searby, San Francisco, Cal.; Charles T. Heller, St. Paul, Minn.; Max Samson, New Orleans, La.

The president has named Paul L. Hess, of Kansas City, and Charles R. Sherman, of Omaha, Neb., to look after the transportation arrangements in their respective localities. Those intending to



attend the meeting should correspond with the member of the Transportation Committee nearest them. Full information will be published shortly. It is likely that arrangements will be perfected for an A. Ph. A. train, with special cars from Chicago, St. Louis, Cincinnati, and some other points. Reduced railroad rates will be secured and announced by the Committee on Transportation.

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## PENNSYLVANIA PHARMACEUTICAL ASSOCIATION.<sup>1</sup>

The twenty-fifth annual meeting was held at Buena Vista Springs, Franklin County, Pa., June 24th-27th. The address of welcome by the Local Secretary, H. J. Mentzer, was replied to by Dr. C. B. Lowe. The President, W. L. Cliffe, made the annual address. In this he advised the repeal of the initiation fee for new members with the hope of increasing the membership in the Association. He also suggested that the Association pass resolutions favoring the Jov Bill (House Representatives, No. 178), which provides for a tax of 70 cents a proof gallon as against the present tax of \$1.10. In regard to the work of the County Associations and their relationship to the State Association, Mr. Cliffe said:

"To the State Association logically belongs the settlement of all those questions that affect the pharmacists all over the State in a nearly equal manner, such as legislative matters, looking after proper appointments to the State Board and educational matters. To the local or county organization should be delegated the work of correcting trade evils and abuses, the adjustment of price difficulties and the bringing together of its members for a better understanding of their commercial relations generally. Properly managed there is no confliction of interests and complete harmony and co-operation should result.

In regard to the "Bottle Act" of April 28, 1899 (which has been referred to in the Report of the Committee on Legislation for 1899), and copies of which had been distributed during the past year among the druggists of the State, the President said: "This distribution was evidently the work of the people who engineered this bill through the legislature for their own personal ends, under the

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<sup>1</sup> Credit is due to Dr. J. A. Miller, Wm. L. Cliffe and Prof. C. B. Lowe for courtesies in the preparation of this report.

flimsy pretense of legislating for the protection of the public health. It is a veritable absurdity as a legislative enactment, but it stands as a menace to the interests of the drug trade of the State and should be repealed."

Mr. Cliffe also said that, "some years ago, one of the presidents of this Association suggested the advisability of establishing a medal to be awarded annually for the best paper upon a pharmaceutical topic, or for a new pharmaceutical device or implement, or for an improvement upon one already in use. Just where the suggestion originated does not seem to be a matter of record, but the plan is one that commands attention as being well adapted for increasing the value of the work of your Committee on Papers and Queries, which has contributed so materially to the high standing of this Association in the past. It is probable that the low state of the finances at the time it was proposed practically precluded consideration of the plan. Now, however, a majority of the ex-presidents have, after a consideration of the question, offered to donate the funds necessary to purchase a die for such a medal if it is the desire of the Association to institute such a prize. The only expense to the Association under this plan would be the small sum annually for the casting and such engraving as might be necessary. It would seem to be a proper method of perpetuating the memory of some deceased and honored member of the Association."

The reports of the Secretary and Treasurer were then received, the latter reporting a balance of about \$76. On Wednesday morning, Harry L. Stiles, Chairman of the Committee on Trade Interests, made a very interesting report of the excellent work done this past year in assisting in the organization of numerous local societies of pharmacists. A unanimous vote of thanks was tendered the committee. Short speeches were then made by various members representing some of these local societies. The conditions on the whole were quite encouraging, especially so in Western Pennsylvania and in Dauphin County; quite a discussion was had upon the evil effects of purchases made by mail agents which have proved to be a somewhat disturbing factor. The subject was referred to the committee for investigation and advice as to the action to be taken.

The Executive Committee made an interesting report of the work done by them the past year. The Committee on Adulterations reported having investigated a number of drugs the past year, amongst them being asafetida and flaxseed meal.

The Committee on Nominations presented the names of the following who were afterwards unanimously elected: President, Chas. L. Hay, Dubois; Vice-Presidents, H. L. Stiles, Philadelphia and H. J. Mentzer, Waynesboro; Secretary, J. A. Miller, Harrisburg; Treasurer, J. L. Lemberger, Lebanon; Executive Committee: Wm. O. Frailey, Lancaster; E. E. Heck, Pittsburg and C. E. Griffith, Johnstown; Local Secretary, David Horn, Jr., Harrisburg.

The following resolution was unanimously adopted and ordered to be sent to the Pharmacopœial Revision Committee: "Be it resolved by the Pennsylvania Pharmaceutical Association in annual session assembled, That whereas the U. S. Pharmacopœia standards of strength and purity have come to be recognized by the courts as those to which all chemicals and preparations must conform, therefore, we would *most strongly* urge upon the U. S. Pharmacopœia Revision Committee the wisdom and necessity of fixing those standards at readily attainable points, and not at ultra-scientific heights which it is almost *impossible to reach*, or if attainable, are only so at *greatly increased cost without corresponding medicinal advantage*."

The Committee on Papers and Queries were so successful in arousing interest in this work that a special vote of thanks was given its Chairman, H. F. Ruhl, of Manheim, who had taken up the work at a late date.

The following papers were presented:

"Adulterated Asafetida." By Charles H. LaWall. (See this JOURNAL, p. 395).

"How to Keep and Care for Leeches." By J. L. Lemberger.

"Gasometric Analysis." By Frank X. Moerk. (See this JOURNAL, p. 389).

"Hydrogen Dioxid." By Robert C. Pursel.

"Synthetic Remedies." By M. I. Wilbert. This paper will be printed in a later issue of this JOURNAL. In the discussion on the evils arising from the introduction and sale of the numerous synthetics and proprietary articles, a resolution was adopted referring the matter to the delegates for presentation at the next meeting of the State Medical Association, if the delegates shall deem it wise.

"Should Pharmacists Always Obey the Rules Laid Down in the Pharmacopœia." By Joseph P. Remington. (See this JOURNAL, p. 384).

"Tincture of Arnica Flowers." H. F. Ruhl suggested a modification of the U.S.P. process.

"The Preparation of Tincture of Iodine." By P. Henry Utech. The author suggests a method of circulatory displacement. The iodine (70 grammes) is placed in a muslin bag and suspended in a flask, just below the surface of the liquid, using about 900 c.c. of alcohol. In 20 or 30 minutes the bag is removed, and washed with alcohol sufficient to make 1,000 c.c.

"Triturations of Physostigmine Salts with Boric Acid." J. S. Beamensderfer considers the preparation as one which keeps the physostigmine in a condition for ready solution.

"The Preparation of Oleates, Oleo-Palmitates and Oleo-Stearates in Powder Form." By Frederic E. Niece.

"Laws Regulating the Sale of Poisons." By J. L. Lemberger.

"Profession and Trade." By John F. Patton. The author said of the schemes that have for their object the betterment of the material condition of the pharmacist, by merely increasing his compensation, the authors forget that "that can only come through higher and better service."

"The Treatment of Wounds by the Apothecary" was the subject of an interesting lecture by Prof. C. B. Lowe. (See page 386).

The closing of drug stores on Sunday, with the exception of an hour or two at noon and evening, for prescriptions only, was considered by W. O. Skelton. The writer has found, with ten years of experience, that it is feasible and desirable.

"The Consolidation of Drug Stores." W. H. Reed, in discussing this question, said:

"The association of drug stores could be brought about in this way: The stores of a populous county or several counties should form into a union and select one of the most central stores for its base of supplies. This central store would do all of the purchasing, manufacturing of products and attend to all executive work. With telegraph, telephone, postal and railway service—these modern improvements and conveniences—the work between the stores of the consolidation or union would be materially facilitated.

"By such a union, I believe, the profession and business of pharmacy would be improved and elevated. Better service would be given the public, and the average store would be improved in appearance and efficiency. The standard of service of the store would be better, as none but competent help would be placed in charge, and the routine duties of the manager lightened. With a central store of supplies, much less stock of certain kinds would

have to be carried by the individual stores. Good and living salaries out of the profits could be paid all managers, and large dividends to stockholders of the union would be forthcoming."

"The Prevention of Cutting." J. H. Redsecker suggested that either the manufacturer must sell direct to the retailer, or that some one jobber in a given territory be made "the distributing agent who shall sell only to such as have signed the contract to maintain prices, and hold him to a strict account for the distribution of the goods. Then the cutter, unable to get the goods, would be compelled to sign the proprietor's contract, and having done so, he would cease to be a cutter."

"Methods of Advertising for Pharmacists." L. S. Vowell considered the different forms of advertising and which were the most advantageous.

The Entertainment Committee provided an excellent program. One of the most pleasant features connected with the meeting was the presentation to the secretary, Dr. J. A. Miller, and to the treasurer, Jos. L. Lemberger, each a handsome solid silver service as a token of the appreciation of the members of their continuous services for twenty-five years in these respective offices. It was a splendid and well-deserved tribute to these officers and the committee carried out their part of the work well.

This being a conjoint meeting with the Maryland Pharmaceutical Association, several receptions were arranged. A severe storm, however, prevented the members of the Maryland Association from meeting with the members of the Pennsylvania Association on the evening arranged.

The next meeting will be held at Eaglesmere the fourth week in June, 1903.

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## PHILADELPHIA COLLEGE OF PHARMACY.

The quarterly meeting of the members of the Philadelphia College of Pharmacy was held June 30, 1901, at 4 P.M. The President, Howard B. French, in the chair.

Twenty members were present. The minutes of the annual meeting, held March 30th, were read and approved. The minutes of the Board of Trustees for the meetings, held March 4th, April 1st, April 11th and May 6th, were read by the Registrar, W. Nelson Stem, and approved.

The Committee on Necrology, by its chairman, George M. Beringer, presented a report containing memoirs of Charles W. Warrington and Henry C. C. Maisch. Mention was also made of the decease of the following honorary members: William Martindale, of London, Eng.; Charles Mohr, of Mobile, Ala.; and

Dr. Nils Peter Hamberg, of Stockholm, Sweden. Appropriate memoirs are being prepared and will be published in the AMERICAN JOURNAL OF PHARMACY. The editor of this JOURNAL had secured and published memoirs of Emil Scheffer, Dr. Charles Rice and other prominent pharmacists.

The delegates to the Pennsylvania Pharmaceutical Association to the meeting held at Buena Vista Springs Hotel, Pa., reported that the meeting was well attended. Valuable reports were read by the Committees on Adulteration, Trade Interests and County Associations. At one of the sessions a number of the unanswered queries were taken up for discussion. Many valuable points were presented by a number of participants.

The work of the National Association of Retail Druggists was endorsed by the Association.

The Maryland Pharmaceutical Association being in session at the Blue Mountain House, a few miles distant, gave an opportunity for exchange of courtesies which were much enjoyed.

Among a number of pleasant incidents of the meeting was the presentation of a silver tea-service to Dr. J. A. Miller, secretary, and J. L. Lemberger, treasurer. They had served the Association twenty-five years in their respective offices.

For other details, some of which were included in the report of the delegates, see p. 405 of this JOURNAL, where will be found a full account of the meeting.

The following letter was read :

JUNE 23, 1902.

*To the Philadelphia College of Pharmacy.*

GENTLEMEN : I take pleasure in presenting you with a photo of Mr. Charles Bullock, which I beg you to accept with the compliments of one who is an old graduate of the College.

Very truly yours,

F. GUTEKUNST,

Per A.N.S.

The photo alluded to is a most excellent likeness of the late president. The portrait was heartily accepted and the secretary directed to convey to Mr. Gutekunst the thanks of the College.

A communication was received from the National College of Pharmacy, of Washington, D. C., referring to the "possibility of securing the establishment of a department in the newly formed 'Carnegie Institute,' devoted to the subject of pharmacy," which was referred to the Committee on Instruction.

An invitation was received from Charles Caspari, Jr., General Secretary of the American Pharmaceutical Association, for the College to be represented by delegates to the Golden Jubilee Session to be held in commemoration of the fiftieth anniversary of the organization.

Mr. Wilbert moved that an invitation be extended to the members of the American Pharmaceutical Association to visit the College during the sessions. So ordered.

The president announced the following appointments: Delegates to the American Pharmaceutical Association—Prof. Henry Kraemer, Chairman; Mahlon N. Kline, Jacob H. Redsecker, Prof. C. B. Lowe and Prof. F. X. Moerk.

Committee on Nominations: Jacob M. Baer, Chairman; Prof. Samuel P. Sadtler, Edwin M. Boring, Theodore Campbell and Henry C. Blair 3d.

Committee on Necrology: Prof. Henry Kraemer, Chairman; Gustavus Pile and Joseph W. England.

C. A. WEIDEMANN, *Secretary.*

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SEPTEMBER, 1902.

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## THE METRIC SYSTEM OF WEIGHTS AND MEASURES IN ENGLISH-SPEAKING COUNTRIES.

BY M. I. WILBERT,  
Apothecary at the German Hospital, Philadelphia.

That the metric system of weights and measures is finally making headway among English-speaking people is evident from the stand that representatives of mechanical and manufacturing industries are taking in regard to it.

With scientific investigators, metric weights and measures have been popular for some time; this is especially true of chemists who have occasion to compare the results of their work with that done in the chemical laboratories of Germany or other portions of continental Europe.

The up-to-date pharmacist has also familiarized himself with, and acknowledges the advantages of, the metric system; so far, however, he has been the exception rather than the rule, and many apothecaries, even in our own country, are content to have their working formulas recalculated for them into grains, drachms, ounces, pints and pounds in preference to using the simpler decimal process made possible by the use of metric quantities.

While the more conservative pharmacist has persistently refused to give the metric system a fair trial, the manufacturers of English countries have been getting practical lessons in the necessity of adapting their products to the needs and wants of the foreign consumers, if they wish to compete successfully for their trade.

British as well as American manufacturers are beginning to heed the lesson, and in England steps are being taken to popularize and

ultimately introduce, not alone the metric system of weights and measures, but also a decimal system of coinage.

That this will be a difficult problem, is readily appreciated when we consider the ultra-conservative spirit of the English people and how they have always clung to old ways and traditions, and persistently objected to any innovations.

To illustrate this we need but recall the fact that England retained the Roman system of notation for centuries after other countries had adopted the now universally used Arabic numerals. A still more recent example is the adoption of the Gregorian calendar, in which England was nearly two hundred years behind the south European States.

From the established precedents we would be justified in asserting that it will be difficult indeed to induce the rank and file of Englishmen to dispense with their pounds, shillings and pence, and to count in decimals.

The British Decimal Association, however, in one of their recent publications report that there is a very decided growth of public opinion in favor of a decimal system of coinage in Great Britain, and the compulsory introduction of the metric system of weights and measures throughout the British Empire.

One factor that has been instrumental in bringing about this change of ideas in England, may be found in the reports of British consular agents, who several years ago were asked to secure information on several vital points connected with the introduction and use of the metric system in the different European countries. All these reports, with the single exception of those from Turkey, were very favorable, both as to the ease and rapidity with which trade conditions had adapted themselves to the new system, and the advantages that the new system had in facilitating computation, thereby saving time. These reports also favored the proposed change from the present confused and complicated English system, to metric units, as being in the line of progress, and a decided step in the proper direction for regaining much of England's former influence, prestige and trade.

In Canada the government has been carefully preparing the way, and is ready to introduce the metric system as soon as the United States and England make the change. The course that has been pursued by the Canadian Government is to make the system widely



understood by teaching it in the schools, and otherwise giving the details of the system wide publicity, especially among such of its citizens as are actively engaged in manufactures or commerce.

It is hoped that by this means the system will have become so well known by the time a necessity for change arises, that the latter will cause little or no disturbance in the ordinary channels of trade.

The feeling that exists among representative manufacturers in our own country is well summed up in the report of the House Committee on Coinage, Weights and Measures, and also in the reports of numerous special committees of industrial as well as scientific societies that have been appointed to inquire into the feasibility of introducing the metric system of weights and measures into the United States.

Among the reports that are of special interest in this connection the writer would like to call particular attention to one recently made to the Franklin Institute, Philadelphia.

This Institute began its career in 1826, and has always taken an active part in the development and advancement of anything pertaining to manufactures and the mechanic arts. The members of the Institute have contributed materially toward advancing manufactures along rational and scientific lines by contributing at the meetings of the Institute or through the columns of its journal such information, gathered from practical experience, as would be of use to others in overcoming problems and difficulties that might arise. In this respect, the Franklin Institute has practically revolutionized the long-cherished belief, that the experiences of a manufacturer are to be used only for his individual benefit and not for the common good.

The nature of the report, and the action that was taken on it, acquire added interest from the fact that twenty-seven years ago the same Institute adopted the majority report of a special committee, appointed for the same purpose, that was unfavorable to the proposed introduction of the metric system in this country.

The report, accepted at that time, after reviewing the history of the metric system, and the peculiar conditions under which it was produced, concluded that the metric system was not based on scientific principles, and that its defects outnumbered its advantages. In addition to this it was thought that the adoption of the metric system would have a tendency to estrange us, commercially, from

England, with whom more than three-fifths of our trade was, at that time, conducted. Altogether the possible benefits were thought to be of less advantage than the probable immediate loss. The general lack of interest in, or appreciation of, the advantages of the metric system, at that time, is apparent from the fact that the memorial that was subsequently forwarded to Congress by the Boston Society of Civil Engineers was endorsed by but seventeen other scientific or industrial organizations (*AM. JOUR. PHAR.*, Vol. 49, p. 612). It should be stated, however, that in the following years several industrial organizations, among them the Philadelphia Engineers' Club, adopted resolutions favoring the introduction of the metric system, especially its compulsory introduction into the curriculum of the public schools.

The agitation at that time was not without some practical results; we find, for instance, that in 1878 the metric system was officially introduced into the United States Marine Hospital Service; subsequently the same system of weights and measures was also adopted by the medical departments of both the United States Army and Navy.

In 1880 the metric system was officially recognized in the U. S. Pharmacopœia, and in the next decennial revision it was used exclusively.

Despite this official recognition, however, the metric system has made comparatively little progress with the rank and file of the medical or pharmaceutical professions, and its general introduction will probably be brought about by the changes that have been made in our commercial and industrial relations with the countries where it has been adopted.

Philadelphia manufacturers having trade relations all over the civilized world, necessarily feel the disadvantages that result from being compelled to use different systems of weights and measures. It was to inquire into this condition of affairs, and the possibility of avoiding them, that the Franklin Institute appointed the special committee "on the feasibility and advisability of adopting the metric system of weights and measures in the United States."

Briefly, the conclusions of this committee, as subsequently endorsed by the Institute, were as follows:

That it is desirable to obtain an international standard of weights and measures.

That the metric system is commendable not alone as a suitable international standard, but also for facility of computation, convenience of memorizing and simplicity of enumeration.

That we cannot expect nations using the metric system to abandon that and use our systems instead.

That the only valid objection that has been made to the metric system is that it cannot continuously be subdivided by two.

That in the case of our decimal currency this objection has proven to be more than overcome by its other advantages.

That as a minimum unit of lineal measurement the millimeter is fully as convenient as the sixteenth or thirty-second of an inch.

That it is not considered practicable to inaugurate the adoption of the metric standards for weights or liquid measures, in advance of the lineal measure, even if the former would not involve as much inconvenience or expense as the latter.

The reading of these conclusions, and the resolutions that were proposed to accompany them, was followed by an interesting discussion that is being published in the current numbers of the *Journal of the Franklin Institute*.

A few additional points that were brought out in the course of this discussion may be of interest to pharmacists.

The meter, or unit of length was, of course, most violently assailed, largely from the standpoint that compulsory adoption of the same would cause confusion, delay and serious loss in machine-shop practice.

Mr. Vauclain, the superintendent of the Baldwin Locomotive Works, Philadelphia, in speaking of the futility of this line of argument, said that no up-to date machine shop could afford to allow its employees to use foot-rules or measuring sticks, but that all modern shop-practice was based on the use of steel gauges, and the working to scale from drawings, instead of using any system of lineal measures. In illustration of this point he said that the works he was connected with employed upward of 11,500 men. The daily output was five complete modern locomotives a day, each one of which required upward of 13,000 separate pieces, accurately made and adjusted before it could be turned out on the track as a finished product.

If we stop to consider that many of these various parts are interchangeable, or that parts are often supplied to replace broken or

damaged parts of a locomotive that has been in use for years, we will appreciate that it would not do in practice to depend on the measuring stick, or measuring ability of the different men that handle each one of these separate pieces.

According to Mr. Vauclain, the only department of a modern machine shop where actual measures are used, is the draughting-room, and here the introduction of the metric system would be hailed as a distinct advance, facilitating as it would the making of drawings to scale, on account of the interchangeability and decimal character of the units or subdivisions of the lineal measure. The chief advantage of the metric system, and the one that is admitted by its most violent opponent, is the correlation that exists between the fundamental units. As was pointed out by another member of the Franklin Institute, this harmony of relation tends to facilitate computation, and also reduces the strain on the memory in arithmetical calculations.

This is of great importance at the present time, where technical or commercial calculations play so important a part in the conduct of every-day business transactions. It will readily be admitted that if all factors could be reduced to decimals a considerable amount of time could be saved in making the extended and many times complicated computations that are necessitated by modern commercial or industrial practices.

Another advantage, and one that should not be lightly gone over, was dwelt on by Mr. Christie, of the American Bridge Company. This is the facility with which one can retain in memory the fundamental elements of the metric system, and the ease with which a clear comprehension of these elements may be impressed even on the mind of a child. We will appreciate this the more if we compare it with the complicated tables that must be memorized, if we wish to retain even a most elementary off-hand knowledge of our complicated systems of weights and measures.

One other objection that is usually made to the metric system is the complicated and to us foreign nomenclature. It is usually asserted that there are too many units, or too many names to be memorized. In answer to this it has been repeatedly pointed out that this is no valid objection, but that in actual practice many of these different names rapidly disappear. In the case of our decimal coinage, mills, dimes and eagles are seldom used or even referred to, the dollar and cent being the only units in practical use.

In addition to this it may be well to state that British as well as American consular reports appear to indicate that the introduction of the metric system has met with least opposition in those countries where it has been allowed to replace, or to be implanted on existing systems of weights and measures. Even in France there was considerable opposition to the metric system until the people were allowed to retain the old and familiar names for weights and measures that more or less closely corresponded to the new ones. The same is true of Holland, Germany, and other countries where the metric system has been introduced.

For commercial purposes the essential feature is that our units for weights and measures, no matter what we choose to call them, should correspond to the meter, liter and kilogram of the metric system. Bearing this in mind and also the fact that there would be less objection to the introduction of a new standard, providing the old names were retained, it might be feasible for Congress to introduce a new or metric standard yard that would be the equal of 1 meter; a new or metric standard quart the equal of 1 liter, and a new or metric pound to equal 500 grammes, or 2 pounds to equal 1 kilogram. These various units could for ordinary purposes be divided into halves, quarters and even eighths, very much as our dollar is used at the present time.

This adaptation of familiar names need not extend beyond the units that are ordinarily used in the course of retail trade, for all other purposes either the French titles or a modification of them should be used.

For physicians or pharmacists, it will be much simpler if they acquaint themselves with metric quantities in the terms of the metric system as used by scientific men all over the world; a reasonable and fair trial will convince any one that this is not even a difficult task, to say nothing of its being impossible.

Looking ahead, it is fair to assume that another decade will see the use of the metric system firmly established in every civilized country of the globe, and it is to be sincerely wished that the pharmacists of the country will contribute their share to bringing about a reform that is as simple as it is sensible.

Officially, the pharmacist of the country has done good work in bringing the metric system to the attention of many that would not otherwise have paid much attention to it. Even in the immediate

future there is little to fear of any backward step being taken, at least not in the coming edition of the United States Pharmacopœia. The committee having the revision in charge has been definitely instructed to retain the metric system of weights and measures, as adopted in the last decennial revision, and unless the members of this committee are individually and collectively willing to betray the trust that has been placed in them by the Convention of 1900, they will not in any way abrogate or change from the advance that was made more than ten years ago. On the other hand, let us hope that the Revision Committee will jealously guard the established record, so that the professions of medicine and pharmacy may go down in history as being, at least officially, ahead of their contemporaries in furthering a reform that should have been introduced long ago.

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### HYOSCYAMUS MUTICUS.

BY J. B. NAGELVOORT.

It seems feasible to grow this plant in a temperate zone, which would be a pleasing solution of our dependency on European *Hyoscyamus niger*, arriving, as this often does, in a very poor condition for pharmaceutical purposes—mouldy, blackened, low in alkaloidal contents.

Seed, personally obtained from Egypt, has grown to small plants, promising well, under different conditions; in sand, in poor sandy soil, and in common garden soil, in the United States as well as in Holland.

Of course there is still a wide stretch between this condition and mercantile requirements.

It might not be superfluous to refer to Gadamer, *Archiv d. Pharm.*, 1898, 236, 704 [leaves of *Hyoscyamus muticus* contained  $\pm 1.4$  per cent. (one and four-tenths per cent.) Hyoscyamine]. And to Dunstan and Brown, Transactions of the (English) Chemical Society, 1901, vol. 79, "The quantity obtained corresponded with 0.87 per cent. (eighty-seven hundredths) calculated on the dry material."

The calculations of 0.1 per cent. (one-tenth) and less, of hyoscyamine, in henbane, obtained in the European market, are usually made on the material, air-dried and in a condition to be pulverized and sifted. This condition will not differ, therefore, very much from the condition of Professor Dunstan's material.

The above facts will happily obliterate the proposed titration of the mydriatic alkaloids in an assay of henbane preparations, using iodeosin as indicator, whereby Prof. E. Schmidt obtained 0.286 per cent. alkaloid.<sup>1</sup> Dunstan isolated his alkaloid, ready for the balance, in a crystalline condition, which I consider a far safer way of operating. The use of iodeosin is attended by so many details, which have to be scrupulously carried out, or the results of its application are apt to be misinterpreted, if the method were to be generally applied.

I cannot forego to quote Prof. E. Schaer "On the action of chloroform and similar solvents on alkaloidal salts (*Ph. J.*, March 24, 1900)," because Dunstan reports, "in fractionally crystallizing this alkaloid, by adding light petroleum to its solution in dry chloroform, it was nearly all obtained in white, silky needles, melting at 105°."

N. B.—I have some of the original Egyptian material of *Hyoscyamus muticus* left, and shall be pleased to let any one who is interested in this investigation have some (care of editor AM. JR. PH.).

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## DRUG AND MEDICINAL-PLANT INVESTIGATIONS IN THE DEPARTMENT OF AGRICULTURE.

BY RODNEY H. TRUE.

Those familiar with the question of the supply of crude drugs for the American market are well aware that at the present time by far the larger part of our supply of crude drugs not derived from plants exclusively American in their location is obtained from foreign sources—chiefly from Germany, Austria, Belgium and England. Other drugs of great importance are derived from the Orient, conspicuously cinchona and opium, and South America furnishes ipecac and coca leaves. Of these drugs, quantities valued at more than \$6,000,000 are annually imported into the United States. Some of them are here worked up by manufacturing chemists into their characteristic active principles, and others are used directly for the preparation of medicines.

It has long been a matter of earnest inquiry by thoughtful men whether of these articles some considerable proportion could not be grown in this country, offering, as the United States does, a great variety of climatic and soil conditions. Apart, nowever, from

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<sup>1</sup> *Apotheker Zeitung*, 1900, No. 2.

sporadic experiments by individuals, which have not greatly affected the market as a whole, little has been accomplished, and the last census shows a very large importation of articles of this nature. This desire on the part of far-sighted men connected with the drug business in this country for a thoroughgoing attempt to develop drug cultivation as an American industry, has been indicated in resolutions before pharmaceutical conventions and other bodies of like nature. The drug-plant investigations of the Bureau of Plant Industry have been reorganized, and, in response to the demands of the times, are concerned with the problems of our crude drug supply.

The work begun includes the cultivation of a considerable number of the most important plants capable of growth under American conditions of climate and soil in widely separated parts of the country. The kinds of plants are belladonna, hyoscyamus, stramonium, digitalis, aconite, arnica, the opium poppy and licorice. Trial plats of these plants have been started in Florida, North Carolina, at Washington, D. C.; in Massachusetts, Vermont, Wisconsin and Washington (both east and west of the Cascades). The information to be derived from widely separated experiments will doubtless enable us to judge in what part or parts of the country the particular plants in question will reach their best development. In order to give larger amounts of material for laboratory study, half-acre plats of a number of these drugs are being provided at Washington, D. C., and at Dover, Mass. A careful assay of these drugs for the active principles will be made in the hope of gaining a rough idea of the quality of the drug produced under the different conditions here concerned. This will, of course, need to be repeated for a number of years in order to eliminate special influences of the seasons. The Bureau of Chemistry will co-operate with the Bureau of Plant Industry providing for a careful assaying of the samples sent in from the field. There is also contemplated in connection with this work a pharmacological study of drugs wherever physiological tests are desirable to support the other work.

The questions first to be investigated concern very practical matters. The time of collection of the drug will be carefully investigated. In the case of leaf drugs the plan provides for the collection of samples at different stages of development and for their careful assay for the active principle. Thus we shall be able with



abundant reason to indicate that stage in the plant's growth at which the maximum amount of active principle can be obtained, and to put on a more solid basis a matter which at present rests on a more or less traditional foundation.

The manner of curing the drug to preserve both appearance and active principle will be taken up among the earliest subjects for investigation. Custom at present dictates how drugs shall be cured, and the scientific evidence underlying this custom is weak. Curing by artificial heat at various degrees, curing by natural heat, curing in the sunlight and curing in the shade, will be studied with reference to the effect on the appearance of the drug and on the assay qualities. The part played by the oxidizing ferments in bringing about deterioration in drugs will be made a matter of early investigation, and the results of studies made by this department on the curing of tea and tobacco give strong ground for hope that they may be carried over with great profit to the question of drugs.

Field experiments to determine the value of special treatment in enhancing the quality of the drug are also contemplated. The question of the effect of different methods of fertilization and conditions of cultivation, the question of shade and sunlight, and of special methods, such as removing flower-buds, will also be investigated.

It is the hope of those in charge of this work to extend these studies to include the domestication and cultivation of various native drug-plants which at present furnish valuable drugs. Many of these plants, as has been pointed out by various drug-handlers from time to time, are becoming increasingly difficult to obtain in sufficient quantity, and the fear has been expressed that extermination at no very distant date was in store for these things, with the resulting disappearance of the drug from the market. Obviously, this would be a calamity to the human race, and the cultivation of these things under agricultural conditions will be a matter of very careful study. Experiments have already begun on a very small scale with *hydrastis*, *Seneca snakeroot* and *spigelia*. Attempts to find methods of growing seed will be first made, and should this be successful, the cultivation on a commercial scale will be made the subject of investigation.

In so far as opportunity allows, the hope is entertained that the investigation of plants promising to furnish valuable new drugs will

be undertaken. There are at present in the West and other parts of the country a number of plants widely used for local difficulties which seem to promise great usefulness. The investigation of a limited number of such cases may be undertaken.

The primary aim of this work will be to render the United States self-supporting in the matter of those crude drugs which can with profit be grown here. This is, of course, a very far-reaching problem, and will require for its solution a long time, patience, and very careful study, both in the laboratory and in the field. Since this work is essentially pioneer work, it is hardly probable that immediate results will be obtained.

In addition to the work above planned, the establishment of a laboratory for the study of drug alteration in the Bureau of Chemistry will contribute another source of valuable information on drugs.

BUREAU OF PLANT INDUSTRY,

U. S. DEPARTMENT OF AGRICULTURE.

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## THE LEECH *HIRUDO* OR *SANGUISUGA*—HOW TO CARE FOR AND KEEP IN GOOD CONDITION.<sup>1</sup>

BY J. L. LEMBERGER.

Some pharmacists sell leeches, and where there is a large demand there is no trouble to keep them without serious loss, as they are usually so well packed in native peat that they can be well kept and remain healthy for several months. But when the demand is only occasional, then a difficulty comes in the way—that of preservation; they become diseased and die, very soon affecting the entire stock.

It will be interesting knowledge to some of us, that as far back as 1837 an enterprising doctor, who went from New York City to Detroit, and who had been a leech doctor in New York (by leech doctor I mean one who had used them in his practice very freely and successfully), experienced great difficulty in procuring them in his new field of practice (the transportation then was not so rapid as it is now, and by the time he got his leeches from New York

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<sup>1</sup> Read at the annual meeting of the Pennsylvania Pharmaceutical Association, June, 1902.

many were dead), so he contrived a plan to make a tank 8 feet long by 6 feet wide by 4 feet deep, placing this in moist or marshy ground near a stream of water, putting about 9 inches of cobble into the tank and running water into it, so that it was kept fresh, receiving the water in the bottom of the tank with an outlet near the top. Both openings had to be protected by a wire cloth or screen to keep the leeches from escaping. He put some leeches into this receptacle and soon found, with a little attention, that he not only had a good stock, with very few casualties, but made quite a business of raising stock for sale. The cobblestones placed in the bottom of the tank afford refuge, and by continual contact with the stones rids them of the slimy deposit that seems to be the natural menace infecting them and causing disease. With this treatment and a few frogs occasionally thrown into the tank about once a week, feeds and sustains them. When thus cared for they breed freely, produce eggs during the months of June and July and mature in two years, increasing the family very rapidly. When ordinary care is given they thrive and live fifteen years.

I am indebted for some of these facts to a paper prepared by the Elder F. Stearns, of Detroit.

Our plan has been to keep them in a small firkin or container of peat in which they are shipped, until they show signs of disease, when they are transferred to a porcelain leech-jar and water frequently renewed, say once or twice a week. In this way they can be kept for a considerably longer time, although they do not grow in size, and unless they are fed they seem to shrink in size. Age, however, does not depreciate their blood-sucking powers, as very frequently the smaller leech is as vigorous as the larger. Where there is a facility for so doing it is certainly better to have them kept in a box similar to the one described, only on a smaller scale. Where water facilities allow, a properly arranged aquarium, in which the same principle can be applied as in the water-tank referred to, will answer all purposes, and can be made a drug-store counter attraction as well.

In conclusion, we affirm that leeches at 50 cents apiece are more profitable than paregoric at 5 cents per fluid ounce.

HYDROGEN PEROXIDE.<sup>1</sup>

BY ROBERT C. PURSEL.

Insufficient time has prevented me from experimenting with the making of hydrogen peroxide in a small way. Having been for several years connected with a firm who manufactured hydrogen peroxide extensively, and it being part of my duties to assay the finished product, I do not think that it can be prepared in a small way profitably. So many firms are making it to-day and competition is so keen that the pharmacist is now enabled to buy hydrogen peroxide, conforming to the U.S.P. requirements, at a reasonable price.

All the barium dioxide used in this country to-day has to be imported; usually it is shipped in strong casks containing about 1200 pounds. This quantity would last the average pharmacist for a considerable length of time, and I think before the last of it was used up it would begin to get hard and lumpy and difficulties would be experienced in working it.

By using phosphoric acid, as the U.S.P. directs, it is almost impossible to get a product that assays 10 volumes of available oxygen. Some manufacturers use hydrofluoric acid (this may be ascertained by applying the U.S.P. test for the acid), and this would necessitate suitable apparatus. The operation would also have to be performed away from shelf-bottles and all glassware, else they would in a short time become beautifully etched. The acidity of a large quantity of hydrogen peroxide can be adjusted as easily, and probably better than that of a small quantity. Altogether there is a great deal to know about the making of hydrogen peroxide that cannot be found in textbooks, and the average pharmacist would encounter great difficulties if he attempted the making of hydrogen peroxide.

Nearly all of the manufacturers of hydrogen peroxide bottle it from a half to one volume above what their label calls for. In this way it will keep under proper conditions for quite awhile and still conform with their label.

Four different makes of hydrogen peroxide were obtained, assayed the day they were received, recorked and kept in the cellar for about six months; they were then assayed with the following results:

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<sup>1</sup> Read at the annual meeting of the Pennsylvania Pharmaceutical Association, June, 1902.

No.	Labelled.	Assayed.	Assayed (after keeping 6 months.)
1 . . 15 volumes	available oxygen.	15.5 volumes.	13.5 volumes.
2 . . 10	" " "	10.5 "	8.75 "
3 . . 10	" " "	10 "	8 "
4 . . 10	" " "	12 "	10.5 "

No. 4, after standing the above-mentioned time, was still as strong as the maker claimed it to be. I believe that if the cork is removed from a package containing hydrogen peroxide as soon as obtained from the manufacturer, and a piece of absorbent cotton inserted, it will keep better. The loss from evaporation is small, and gases forming, which would cause deterioration, are allowed to escape. Possibly this would not be a practical way to treat small packages, but it may be employed where a large bottle is used to dispense from.

LABORATORY OF W. L. CLIFFE, PHILADELPHIA.

## A METHOD OF DIVIDING POWDERS IN PRESCRIPTION WORK.

BY ISAAC M. WEILLS.

Query No. 15. What is the best method for dividing powders in prescription work?

The last few years have seen many time-saving inventions for the pharmacist as well as the druggist, all of which should have been received and hailed as blessings. Many when once used and the old way laid aside for a time are never taken up again except as relics of the past inconveniences. We wonder how we ever were contented to do our work with them; but necessity, it has been said, is "the mother of invention," and has brought out more useful time and labor-saving inventions than all else combined.

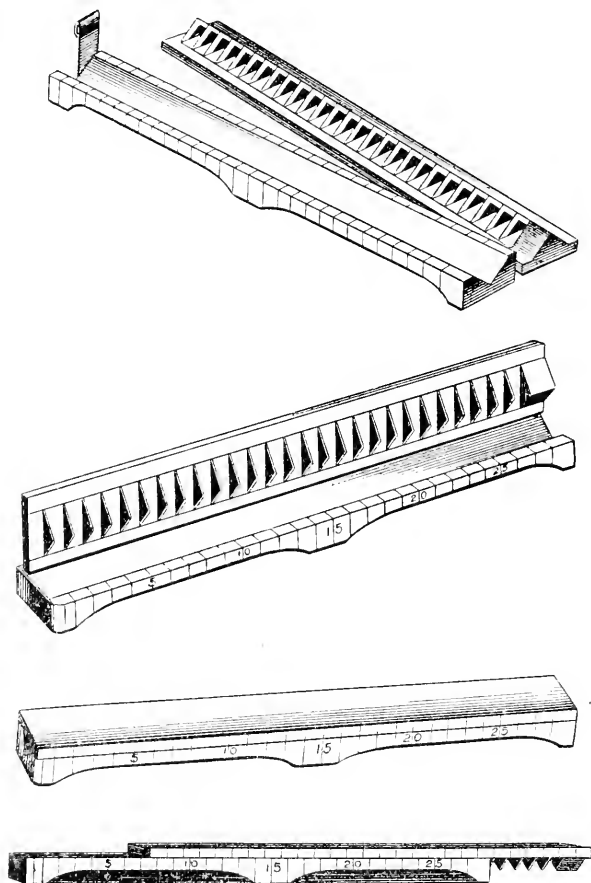
The little device which I now describe is one of this kind. After dividing powders in prescription work for years by weighing each powder separately, as well as by simply dividing with the spatula the thoroughly triturated compounded ingredients into a number of powders called for, I thought of this method, which I think you will all agree with me is an up-to-date device for this work.

It is composed of three pieces. No. 1 is the base and is 7 $\frac{3}{4}$

<sup>1</sup> Read at the annual meeting of the Pennsylvania Pharmaceutical Association, June, 1902.

inches long, 1 inch wide and  $\frac{7}{16}$  inch thick, and has a V-shaped groove plowed out of the top  $\frac{5}{8}$  of an inch wide at the upper end of the V and is  $\frac{9}{32}$  of an inch deep. At one end there is a gate swinging on a screw, which allows it to move up and down freely to close the end of the V.

On one edge it is laid off in quarter inches and numbered by five,



A Device for Dividing Powders in Prescription Work.

ten, fifteen, twenty and twenty-five; thus every fifth mark is numbered.

The second piece is simply a strip of brass  $\frac{1}{32}$  of an inch thick and as large as the end of the first piece.

The third piece is the same length and width as the first. It is  $\frac{1}{8}$  of an inch thick, and on the underside there are twenty-seven knifeblades  $\frac{1}{4}$  of an inch apart, and a block  $\frac{3}{8}$  of an inch long made to fit in the groove in the top of the first piece, and marked on the edge the same as piece No. 1.

When parts one and three are placed together the knifeblades fit in the groove and the marks on the edge of each piece come together and form one line. To operate the machine turn the gate so that the end of the groove is closed by it, then reverse the top-piece so that the block will fill the groove. Now, if you wish, say fifteen powders, simply place the block-end at fifteen, dump your powder in the groove. Now lift part three and reverse it to proper position. Place part three on part one and bring them together, having previously distributed your powder papers. Take up the divider and turn back the gate on part one, place the end of the divider over the powder paper and slide part three along, when the powder will be shoved out of the end of part one by the blade on part three. Now simply continue to move the divider from paper to paper and shoving the parts as for the first powder until all have been shoved out, thus making an even distribution.

I have the device here, and any person who desires can have the opportunity of seeing how it does its work.

In conclusion would say that it is not patented and any pharmacist is at liberty to make or have one made for his or her own use.

There is a cut of the device connected with and made a part of this paper.

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## TINCTURE OF ARNICA FLOWERS.

By H. F. RUHL.

The U.S.P. directions read as follows: "Pack the powder firmly in a cylindrical percolator, and gradually pour diluted alcohol upon it until 1,000 cubic centimetres of tincture are obtained." Maceration is not mentioned.

Following these directions, even with careful percolation, always yielded a light-colored tincture (at the hands of the writer), leaving the drug far from being exhausted. The powder, when packed in a percolator, occupies perhaps 50 per cent. more space than the volume of the finished product. Because the drug is so bulky is no doubt

one of the reasons why it is not easily exhausted by the U.S.P. process. Another reason is because maceration is not recommended.

Mr. W. S. Spickler (at one time in the employ of the writer) suggested a process which might be termed "percolation by installments," as follows: The powder is packed as directed in the Pharmacopœia and menstruum poured on to saturate the drug and leave a stratum above it. When the liquid begins to drop from the percolator the orifice is closed with a cork and left to macerate for forty-eight hours. Percolation is then allowed to proceed slowly until one-fourth of the percolate is obtained. The orifice of the percolator is again closed and the contents allowed to macerate for twelve hours. Percolation then is allowed to proceed until another fourth of percolate is obtained. This last operation is twice repeated until the whole of the percolate is obtained.

The finished percolate is then removed and more menstruum poured on, and percolation is continued until the drug is practically exhausted. This weak percolate is put aside and used to start the operation the next time the tincture is to be prepared.

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## LAWS REGULATING THE SALE OF POISONS.

BY JOSEPH L. LEMBERGER.

The query to which I have consented to give attention appeals to me from the viewpoint of duty to the Commonwealth. We know that from peer to peasant, from the most cultured to the most ignorant, danger threatens their existence by voluntary resort to the use or abuse of poisons, the sale of which may not be sufficiently safeguarded by law. All of us who have been in the active drug business have met with the habitual user of opium or morphia or cocaine, and would gladly have taken refuge from responsibility in a rigid law, and have helped our fellow mortals as they gratified an abnormal desire which must hasten physical wreck. It may be considered a deprivation of personal liberty to offer this suggestion, but in the writer's judgment, after years of observation and the knowledge of misery entailed by the abusive use of poisonous drugs, he feels persuaded that a more stringent law making the indiscriminate purchase less easy, would, in a large measure, serve as a protection against their too free use. We have taken pains to examine our relation to the laws in the sisterhood of States to discover whether



our law is more or less stringent than theirs, and make such information the basis of any judgment on the subject herewith expressed.

Our own State law, in Section 10, prescribes that "A poison in the meaning of this Act shall be any drug, chemical or preparation which, according to standard works on medicine or materia medica, is liable to be destructive to adult human life in quantities of sixty grains or less."

"No person shall sell at retail any poisons, except as herein provided, without affixing to the bottle, box, vessel or package containing the same, a label printed or plainly written, containing the name of the article, the word 'poison' and the name and place of business of the seller; nor shall he deliver poison to any person without satisfying himself that such poison is to be used for legitimate purposes."

"It shall be the further duty of any one selling or dispensing poisons which are known to be destructive to adult human life in quantities of five grains or less, before delivering them, to enter in a book kept for this purpose the name of the seller, the name and residence of the buyer, the name of the article, quantity sold or disposed of and the purpose for which it is said to be intended, which book of registry shall be preserved for at least two years, and shall at all times be open to the inspection of the coroner or courts of the county in which the same be kept."

There is also a law, approved the 12th day of May, 1897, controlling the sale of emmenagogue preparations, as follows:

"SECTION 2. A person who sells, lends, gives away or in any manner exhibits or offers to sell, lend or give away, or has in his possession with intent to sell, lend or give away, or advertises or offers for sale, loan or distribution, any instrument or article, or any recipe, drug or medicine for the prevention of conception, or for causing unlawful abortion, or advertises or holds out representations that it can be so used or applied, or any such description as will be calculated to lead another to so use or apply any such article, recipe, drug, medicine or instrument, or who writes or prints, or causes to be written or printed, a card, circular, pamphlet, advertisement or notice of any kind, or gives information orally, stating when, where, how, of whom or by what means such an instrument, article, recipe, drug or medicine can be purchased or obtained, or who manufac-

tures any such instrument, article, recipe, drug or medicine, is guilty of a misdemeanor, and shall be liable to the same penalties as provided in Section 1 of this Act."

In correspondence with secretaries of the Boards of Pharmacy of all the States in the Union where such a board exists, we have the answers from thirty-eight (38), most of whom give some attention to this very important subject. Some States, however, have no poison law. The following have, and in order to make the paper as complete as possible for comparison, and to determine where we fail to be as careful, or more so, than other States, we note as follows: We have briefly summarized, except in a few instances, where we quote largely. We find many States have adopted the two schedules A and B, as follows:

#### SCHEDULE A.

Arsenic and its preparations; corrosive sublimate; white and red precipitate; bin-iodide of mercury; cyanide of potassium; hydrocyanic acid; strychnia and all other poisons; vegetable alkaloids and their salts; essential oil of bitter almonds; opium and its preparations, except paregoric and other preparations of opium with less than two grains to the ounce.

#### SCHEDULE B.

Aconite; belladonna; colchicum; conium; nux vomica; henbane; savin; ergot; cotton root; cantharides; creosote; digitalis and their pharmaceutical preparations; croton oil; chloroform; chloral hydrate; sulphate of zinc; mineral acids, carbolic acid and oxalic acid.

*Alabama.*—Alabama merges Schedules A and B into one and includes emmenagogue drugs. The minimum penalty is \$10 and the maximum is \$25 for violation.

*Arkansas.*—Arkansas has a special poison law to regulate the sale of cocaine, which can be sold only on the prescription of a physician. A section of this Act regulates also the sale of arsenic and its compounds, strychnia and its salts, corrosive sublimate, hydrocyanic acid, phosphorus, opium, morphine, laudanum. The seller must label plainly in English. No registry required. Minimum penalty is \$25, and the maximum, \$100.

*California.*—California has Schedules A and B, and has the penalty

of \$100 or fifty days imprisonment, either or both at the discretion of the court.

*Colorado.*—Colorado has Schedules A and B, including savin oil and ergot, and prescribes the penalty of a sum not exceeding \$500 and imprisonment in the county jail for six months. Both penalties can be enforced if false name is given by the purchaser.

*Connecticut.*—Connecticut has a separate special Schedule A, including rat-dynamite and rough-on-rats and a general summary of arsenic, strychnia, corrosive sublimate, prussic acid and cyanide of potassium, and keeps a register which, when filled, must be deposited with the town clerk. Penalty for violating, \$1.

*Delaware.*—Delaware has Section 4 of an Act as follows: "Every dispenser of drugs shall keep a record of all sales of arsenic, strychnia and corrosive sublimate, said record to be open to inspection. Penalty for non-compliance, \$5 for each and every offense."

*Dakota, North.*—North Dakota has Schedules A and B. The meaning of poison as in Pennsylvania; must register as in Pennsylvania, with penalty of \$5 for non-compliance.

*Dakota, South.*—South Dakota has part of Schedule A, concluding with "other medicines fatal to human life in doses of from fifteen to sixty grains." Schedule B, the concluding clause of which is "fifteen grains or less. No poisons in Schedule B shall be sold to any person unknown to the seller unless introduced by some person known to the seller. Minimum penalty, \$25; maximum, \$100 for every commission."

*District of Columbia.*—District of Columbia has Schedules A and B, requiring labeling of box or vessel containing the poison, as well as the outside wrapper. Must register in a book kept for the purpose. The customer must be acquainted with the poisonous character of the article he purchases. Minimum penalty \$25, maximum \$100.

*Florida.*—Florida merges Schedules A and B. Unregistered pharmacists cannot sell. Registered pharmacists keep no record, but must label name of poison, name and place of business of seller, purchaser must be aware of poisonous character of the drug and must want it for legitimate purposes. Minimum penalty is \$50; maximum, \$100.

*Georgia.*—Georgia has enlarged Schedules A and B, including some of the mineral acids and a special Act regulating the sale of opium

and its preparations to habitual users. We give Sections 1 and 2 of their law :

SECTION 1. That it shall not be lawful for any druggist or other dealer in drugs and medicines to sell or offer for sale any sulphate or other preparations of morphine in any bottle, vial, envelope, or other package, unless the same be wrapped in a scarlet paper or envelope, and all bottles or vials used for the above purpose shall have, in addition to said scarlet wrapper, a scarlet label lettered in white letters, plainly naming the contents of said bottle.

SEC. 2 covers the penalty, which is not less than \$10 nor more than \$50, at the discretion of the court, for each and every violation of the preceding section.

*Illinois.*—Illinois names a few poisons and then generalizes articles usually denominated poisonous. The seller must mark poison, and if he fails to keep a record of sale, kind, quantity, or the purchaser gives false name, unless prescribed by a physician, he pays a minimum penalty of \$25 or maximum of \$50.

*Indiana.*—Indiana allows merchants to sell paris green, white hellebore, London purple, and any chemicals used as insecticides, and has a special Act forbidding sale, gift or barter of opium, morphine or cocaine to any person addicted to the habitual use of the same. Penalties for violation: minimum \$10 and maximum \$50 for each offense.

*Iowa.*—Schedules A and B require proper poison labels, must register sale and sell only to persons familiar with the character of poison and who represent it to be used for proper purposes.

*Kansas.*—Kansas has Schedules A and B and in addition Schedule C on emmenagogues, in which a provision is made that they shall not be sold except on a physician's prescriptions. Prescriptions shall be retained by the dispenser. Penalty: minimum \$25, maximum \$100.

*Kentucky.*—Kentucky requires the registry of the sale of poisons, making special mention that emmenagogues, such as preparations of tansy, savin, ergot, cotton root (proprietary or otherwise), shall not be sold only upon the original prescription of a legally qualified physician, and makes a violation a misdemeanor and penalty of not less than \$10, and has a special section providing for the sale of cocaine only upon the original prescription of a legally qualified physician or dentist, forbidding the refilling of a prescription except

it be renewed by the physician. Penalty of \$50 attached for violation. It further provides that cocaine and its salts shall be sold at wholesale only to pharmacists registered under this Act to legally qualified physicians and dentists.

*Louisiana.*—Louisiana has a special Act prohibiting the sale of cocaine except on written prescription of a physician and cannot repeat prescriptions under penalty. We quote two sections of this law on account of its peculiarity:

“That all pharmacists, druggists or apothecaries shall label all bottles, vials, jars, boxes, parcels, packages, or other receptacles or coverings or wrappings of drugs, medicines or chemicals sold or dispensed by them, with a label in legible writing or printed letters, giving the name of the proprietor of the store, the name of the physician prescribing, shop and the place of sale of said drug, medicine or chemical; and in case the medicine, drug or chemical be of a nature poisonous to the human system or to animals, said label shall have printed thereon a skull and cross-bones, with the word ‘Poison’ in large heavy lettering. All prescriptions shall have in addition thereto a number, the name of the person actually and personally compounding the same, the directions for its use internally or externally, and the date of its compounding.

“SECTION 8. That any person offending against the provisions of this Act shall be deemed guilty of a misdemeanor against the State of Louisiana, and shall be prosecuted before any court of criminal jurisdiction, and if adjudged guilty, shall pay a fine of not less than fifty dollars (\$50) nor more than one hundred dollars (\$100), and in default of payment thereof shall be imprisoned in the parish jail for not more than thirty (30) days.”

*Massachusetts.*—Massachusetts includes with most of the articles found in Schedules A and B, M'Munn's Elixir, Parson's Vermin Exterminator, paris green, rough-on-rats, oils of pennyroyal, savin and tansy, phosphorus, ergot and its fluid extract, forbids the sale of cocaine, except on physicians' prescriptions. The name of poison and name of antidote must go on the package. Penalty \$50 and same for giving fictitious name.

*Maine.*—Maine merges Schedules A and B and says, whoever sells without a written prescription of a physician shall register. No sale of cocaine or its salts shall be made except by dentists or on physician's written prescription. Must label all sales not made

on prescription on a label of red paper with the word "Poison" and antidote shall be named on label. Every failure to label shall be punished by penalty not exceeding \$50.

*Maryland.*—Maryland has just come into possession of a poison law, approved April 11, 1902, and combines Schedules A and B, which require registration of the sale of any of the enumerated articles in their schedules. The offender is liable to a fine of not less than \$5 nor more than \$100.

*Missouri.*—Missouri has Schedules A and B. Must label the inside and outside of the package, keep a book; the user must know the poisonous character of the article. Penalty, minimum, \$25; maximum, \$100. False representation receives the same penalty.

*Minnesota.*—Minnesota merges the two schedules, but excepts paris green and includes rough-on-rats. A violation is a misdemeanor, with a fine of \$50. Giving a false name same penalty.

*Michigan.*—Michigan has an Act to regulate the practice of pharmacy, but no poison law.

*Montana.*—Montana has Schedules A and B. The penalty, if found guilty, a misdemeanor and punished as such.

*Nebraska.*—Nebraska has seven conditions: (1) Registers the name, age, sex and color. (2) Quantity sold. (3) Purpose for which required. (4) Day and date of purchase. (5) Name and place of abode of person for whom intended. (6) Must carefully mark poison. (7) Neither sell or give away to minors of either sex. (8) Prohibits sale or gift of less than one pound of arsenic without mixing either soot or indigo in portions of one ounce or half-ounce to the pound of arsenic. Penalty, minimum, \$20; maximum, \$200.

*New Jersey.*—New Jersey enumerates Schedules A and B, makes the penalty \$100 and costs for violation.

*New Hampshire.*—New Hampshire requires the registry of sales of arsenic, strychnia, prussic acid, corrosive sublimate and nuxvomica.

*New Mexico.*—New Mexico has Schedules A and B and provides for the registering of sales of all poisons as enumerated.

We believe our own statute to be weak in not requiring an age condition similar to the thought expressed in the Ohio, Virginia and Nebraska law. There is no plainer law, nor one more easily comprehended than our own, but we realize how readily persons

can obtain anything they want either in person or by proxy—the latter may be a child or an idiot. A note written by the party desiring a poison can have it if the dealer wants to sell it. Would it not be wise to interest the pharmacists of the State, and more particularly the Board of Pharmacy, or the Committee on Legislation, to use their influence for properly amending Section 10 of the Act of 1891, so that we may have a greater safeguard in the sale of poisons? The writer believes that children should not be the carriers of either laudanum or morphia, in granules or powders, nor any other poisonous preparations, and that the law should be so specific that parents and others must realize the importance of applying in person or use adults in the transaction of such business. We do not believe that the custom of selling poisons to minors prevails to any great extent, but the way is open for the dealer to do so, and therefore our law for the sale of poisons should be made more effective.

*New York.*—New York has Schedules A and B. Includes white hellebore and all preparations liable to poison in quantities of sixty grains or less. Must satisfy himself that the purchaser is aware of the poisonous character of the article. Must register. Must use a red-ink label and mark well—poison! Must register all sales.

*Ohio.*—"Section 1. It shall be unlawful for any person to knowingly sell or deliver to any minor under sixteen years of age, except upon the written order of an adult, or to sell or deliver to any person, any of the following described substances, or any poisonous compound, poisonous combination or poisonous preparation thereof, to wit.: The compounds and salts of antimony, arsenic, chromium, copper, lead, mercury, zinc, the concentrated mineral acids, oxalic and hydrocyanic acids and their salts, yellow phosphorus, carbolic acid, the essential oils of almonds, pennyroyal, tansy and savin, croton oil, creosote, chloroform, chloral hydrate, cantharides, or any aconite, belladonna, bitter almonds, colchicum, cotton root, coccus indicus, conium, cannabis indica, digitalis, hyoscyamus, ignatia, lobelia, nux vomica, opium, physostigma, phytolacca, strophanthus, stramonium, veratrum viride, or any of the poisonous alkaloids or alkaloidal salts or other poisonous principles derived from the foregoing, or any other poisonous alkaloids or their salts or any other virulent poison, except in the manner following:

"It shall first be learned by due inquiry that the person to whom

delivery is made is aware of the poisonous character of the substance, and that it is desired for a lawful purpose; and the box, bottle or other package shall be plainly labeled with the name of the substance, the word 'poison,' and the names of two or more substances which may be used as antidotes. And before delivery shall be made of any of the foregoing substances, there shall be recorded in a book kept for that purpose the name of the article, the quantity delivered, the purpose for which it is alleged to be used, the date of delivery, the name and address of the purchaser, and the name of the dispenser, which book shall be preserved for at least five years, and shall at all times be open to inspection by the proper officers of the law."

Section 3 is strikingly good.

"SECTION 3. It shall be unlawful for any person to dispense, sell or deliver to any person, any salts of cocaine, morphine or its salts, or any of the alkaloids or salts of alkaloids of opium, except upon the written prescription of a legally qualified physician or dentist, such prescription not to be refilled, except upon the written order of the person prescribing the same, except, however, that sulphate of morphine may be sold by a registered pharmacist or assistant pharmacist in original packages containing not less than  $\frac{1}{8}$  ounce when registered in accordance with the provisions of Section 1 of this Act."

The penalty is : minimum \$10, maximum \$50, for each offense.

*Oklahoma.*—Oklahoma follows North Dakota and has a penalty—minimum \$25, maximum \$100.

*Oregon.*—Oregon merges both schedules, including emmenagogue drugs; must make due inquiry that the purchaser has knowledge of the poisonous character and represents the article is to be used for legitimate purposes. Must also keep a register. The minimum penalty is \$10 and maximum of \$100 for each offense.

*Rhode Island.*—Rhode Island and Providence Plantation has Schedule A covering most of the articles and better classified than North Dakota, and includes proprietary articles recommended as emmenagogues and parturients. Their Schedule B indicates the form of a poison book.

*Tennessee.*—Tennessee has Schedules A and B as North Dakota. Minimum penalty of \$20 and maximum of \$100.

*Utah.*—Utah has Schedules A and B merged, and requires a red



label for poisonous sales, bearing the name of the article and the word "poison" distinctly shown, with place of business and the name of the seller, who shall not deliver any of said poisons without satisfying himself that said poisons are to be used for legitimate purposes, but does not apply to the dispensing of such on physicians' prescriptions. The pharmacist is not required to register poison sales. A penalty for neglecting to label or sale for other than legitimate purposes is \$300 for each and every such offense.

They also have a section designated, "Omitting to Label or Mislabeling Drugs." A violation for omitting to label or mislabeling, or substituting another drug for one ordered fraudulently, is classed and punished as a misdemeanor, and should death ensue from such wrong doing, it is punished as a felony.

*Vermont.*—Vermont has no law regulating the sale of poisons.

*Virginia.*—Virginia has Schedules A and B requiring a label and at least two most effective available antidotes. Cannot sell to any one under sixteen years of age, except on the written order of a responsible adult person. Entry to be kept in a record book. The minimum penalty \$10, maximum \$100, for each day's violation.

*West Virginia.*—West Virginia has Schedules A and B, the same as North Dakota; each sale must be marked poison, with death's head, and register similar to Pennsylvania. Minimum penalty \$25, maximum \$100.

*Wisconsin.*—Wisconsin excepts paris green if properly labeled, but includes phosphorus and sulphuric ether, and all the rest of Schedules A and B. Minimum penalty \$5, maximum \$50. (Read at the Pennsylvania Pharmaceutical Association, June, 1902.)

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## THE PREPARATION OF OLEATES, OLEO-PALMITATES AND OLEO-STEARATES IN POWDER FORM.<sup>1</sup>

BY FREDERIC E. NIECE.

In answer to the above query, mention will be made more in a general way so as to not only embody the full desire of the text, but at the same time include such data as would incidentally suggest itself and have a bearing on the question at hand. As regards the

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<sup>1</sup> Read at the Pennsylvania Pharmaceutical Association, June, 1902.

oleo-stearates and oleo-palmitates we find, that in them, we have an invaluable class of substances that act as helpful bearers for an innumerable amount of active medicaments.

The use of the above in their plain, uncombined state, however, is very little desired, but they are most usually used in combination with other substances which find ready application in medicine and surgery and, as such, have a vast sphere of adaptability. These medicaments are substances which are capable of uniting directly with them without altering the properties of either in the least, but enhancing their therapeutic value instead, which, while in such a state of combination, have a field of application wide and extensive. In the preparation of the oleo-stearates and oleo-palmitates, as here suggested, the base-zinc is made use of, but potassium, sodium, magnesium or calcium along with the antiseptic properties of lead, copper and mercury can also be incorporated to suit circumstances.

But as zinc furnishes a base most desirable in all directions, the same will be made use of in the following formulæ, for it has chemical, physical and therapeutic virtues not possessed by the others. In preparing the following solutions, glass instruments should be used throughout the entire process as indicated in each case, so as to insure satisfactory results:

#### PULVERIZED OLEO-STEARATE OF ZINC.

First prepare a solution of zinc as follows:

##### SOLUTION ZINC ACETATE.

Zinc acetate	grs. 200
Water distilled	℥ij

Mix and dissolve to a clear solution, strain if any insoluble particles are noticeable.

Right here the fact should be mentioned that, if a desire is created for any other base than the one suggested, as, for instance, copper, lead or mercury, the acetates of these may be used instead of the zinc acetate.

The process is carried out as formulated and the results will correspond to conditions prevailing. Next proceed to prepare the following:

SOLUTION OLEO-STEARATE OF POTASH.

SOLUTION NO. I.

Potassium hydrate	grs. lxxx
Alcohol 95 per cent.	℥ij

Mix and dissolve to a clear solution.

SOLUTION NO. II.

Acid, stearic (fine shavings)	grs. ccccxv
Acid, oleic	grs. lxxx
Alcohol 95 per cent.	℥ij

[To be continued.]

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PROGRESS IN PHARMACY.

A QUARTERLY REVIEW OF SOME OF THE MORE INTERESTING ADVANCES  
IN PHARMACY AND MATERIA MEDICA.

BY M. I. WILBERT.

Apothecary at the German Hospital, Philadelphia.

The most interesting book, from a pharmaceutical point of view, that has been published recently is the "Universal Pharmakopöe," by Dr. Bruno Hirsh. The first volume of this work was noticed in a previous number of this JOURNAL (p. 87, 1902), the second has just been issued, and with it a valediction of the veteran compiler, who considers this, the second edition of this monumental work, a fitting close to a long life spent in the interests of pharmacy and its allied branches. Some idea as to the amount of material that has been gathered together within the covers of these two volumes may be had when we realize that of the 1,062 closely printed pages, no less than 47 are taken up by the index, printed three columns to a page.

The advent of this work, at this time, should be of particular interest and value to all who are in any way interested in the coming revision of the United States Pharmacopœia. This work is not alone full of information as to the difference in strength of the various drugs and preparations, but is also full of suggestions for generalizing and equalizing these differences, so that, if properly used, it would prove a mine of useful information.

Another interesting contribution that should be of particular value to the members of the Pharmacopœial Revision Committee, is a review on "the application of microscopical characteristics of vegetable drugs in the Swedish Pharmacopœia," by A. von Vogl (*Phar. Post, Vienna*, 1902, p. 219). After reviewing the advances

that have been made in pharmacognosy, since the introduction of the compound microscope, the writer gives some interesting data as to the necessity of including descriptions of powdered drugs in modern pharmacopœias. He then points out the fact that the descriptions of powdered drugs in the Swedish Pharmacopœia are, on the whole, satisfactory, and a marked advance on those published in the German Pharmacopœia. In a detailed review of the subject Vogl considers that microscopic characteristics are absolutely necessary for all drugs that can only be positively recognized by means of the microscope, either as to purity or quality; for instance, for such drugs as only occur in the form of powder, as starch, lycopodium and kamala. The compound microscope is also of importance in the recognition of all drugs of organic origin that may or do occur in trade, in the powdered form. These latter drugs may, according to the writer, be divided into two classes, the first having structural characteristics, such as leaves, plants, barks and roots.

The second class includes all drugs not having any structural characteristics but in which the adulterant is likely to have some structural forms, as in the gums, resins, inspissated juices and other drugs of a like nature.

The writer lays particular stress on the desirability of Pharmacopœias, including only the most important characteristics, especially such as are characteristic of the particular drug under comment at the time. Anything beyond this, the author thinks, belongs to a text-book on Pharmacognosy and not in the Pharmacopœia.

Considerable space has been devoted, by the pharmaceutical journals of Continental Europe, to a discussion of the generally precarious and unsettled condition of the apothecaries business. As is well known, in the majority of countries of Continental Europe the practice of pharmacy is hedged in with a variety of more or less irksome and oppressive regulations. Coupled with this, European pharmacists are also suffering from the gradual but, nevertheless, steady decline in prescription business, due to the increase in favor of other non-medical therapeutic measures, such as hot or cold baths, massage, the X-rays and other forms of phototherapeutic measures, all of which have materially decreased the natural sources of income to the pharmacist. Add to this the tremendous and still growing list of patented or proprietary preparations and we can easily appreciate that the position of the European pharmacist can hardly be considered to be any more desirable than our own.

NUMBER OF NEW REMEDIES.

In this connection a list or catalogue of the newer materia medica that is just appearing in the *Pharmaceutische Centralhalle* is of interest. A rather literal translation of the title is: "A list of the newer remedies arranged according to their trade names and also their scientific or chemical titles. By Hugo Mentzel, Dresden." We can get some idea of the number of new remedies that have been foisted on an unsuspecting public when we consider that this list, including, as it does, the references to notices that have appeared in the *Centralhalle* during the past ten years, presents under the single letter A, from Abrastol to Azurin, 418 separate titles, covering 16 closely printed pages. That our own American products are not very effectively covered is evidenced from the fact that a cursory comparison of this catalogue with an American price-list of a recent date showed that upward of fifty American remedies were not included in this single letter. This is certainly food for thought.

Of the drugs and preparations that have been especially noticed in recent pharmaceutical journals we might enumerate:

*Acetone Sulphite*.—This is being introduced as a substitute for sodium sulphite, or potassium metabisulphite. Among the advantages that are claimed for this preparation, as a preserver of photographic developers, is that it may be made in solutions as concentrated as 50 per cent.; it has the property of being itself perfectly stable and keeping photographic-developing solutions clear and colorless.

*Acetozone* is the name given to a powerful oxydizing agent and germicide, formerly known or sold as benzozone. Chemically, it is said to be Benzoyl acetyl peroxide. From a pharmaceutical point of view it is particularly interesting, from the fact that it readily decomposes when brought in contact with glycerin, alcohol or other organic solvents. The manufacturers particularly caution buyers not to bring it in contact with organic matter, nor even keep it in a warm place. Several cases have been reported where the container has been broken with explosive violence, due no doubt to a disregard of some portion of the special caution that accompanies the packages as sent out by the manufacturers.

*Alcohol*.—The increasing use of alcohol, for technical purposes, is attracting considerable attention in several of the European countries. In France, the possibility of using alcohol as a source of

motive power, especially for automobiles, is being actively discussed. In Germany the use of alcohol for illuminating purposes, in connection with incandescent mantles, has made considerable progress. In addition to this several patents have been recently issued for producing alcohol practically in a solid form. These blocks of alcohol, or alcohol-impregnated materials, are now on the market, and are convenient for heating small quantities of liquids.

*Aloes*.—A. Tschirch (*Schweiz. woch. f. Chem. u. Phar.* 1902) confirms his previous statements that Cape aloes is obtained largely, if not entirely, from *Aloe ferox* Miller. According to Tschirch's informant, other species of aloes are not used, chiefly on account of the fact that the juices they contain are too thin and limpid to offer a remunerative quantity of aloes. Another reason is that the leaves do not stack well on account of the absence of the thorny edges, which tend to hold the leaves of *Aloe ferox* in their proper position when placed over and around the depression or receptacle in which the juices are collected.

According to Tschirch, a considerable amount of the juice is now being sold by collectors to factories, where with modern appliances the process of evaporation has been modified to a considerable extent, resulting in an improved product that is being marketed as Crown aloes, and brings a correspondingly better price than the inferior qualities of Cape aloes.

*Anesthesin*, the Ethyl ester of para amido benzoic acid, has been recommended by different observers as an efficient local anesthetic, especially in cases of painful ulcers, or where a surface is to be subsequently cauterized. It is a white powder, odorless and tasteless, having a melting-point of about 89.5; it is slightly soluble in hot water, almost insoluble in cold water, freely soluble in acetone, benzol, chloroform and the fixed or volatile oils. All of the resulting solutions are said to be quite permanent. It has also been given internally in doses of 0.30 to 0.50 two or three times a day.

*Aspirin*, or Acetyl salicylic acid, appears to be finding considerable favor, if we are to judge by the number of notices or articles that we meet with in the current medical journals. The dose is variously given as being from 0.05 to 2.00 four or five times a day. It is said to be an extremely unstable compound, being readily decomposed by solvents like water or alcohol. Welch (*Wiener Med. Press*, 1902) warns against the indiscriminate use of this compound,

particularly in cases of enteric fever or phthisis, in both of which conditions, sudden collapse and other untoward complications have been observed.

From the German journals it appears that Acetyl salicylic acid is being made, and sold in Germany, by several of the large manufacturing chemists, as Acetyl salicylic acid.

*Guaiaicum* has been investigated by several investigators, among them Schaer (*Archiv. f. Exp. Path. u. Pharmacol.*, 1902) who thinks that the antisyphilitic, diaphoretic and antiarthritic properties of guaiac are due to the contained saponin. It has been suggested that this be isolated and compared with other known forms of saponin, especially as to its chemical as well as therapeutic properties.

*Koryzaphylla* is a trade name for a paper handkerchief that is being introduced, especially in Germany, for use by patients suffering from pulmonary tuberculosis, grippé, or any other affection of the mucous surfaces of the nose or throat. They have been recommended by practitioners as a hygienic measure to prevent possible infection, by burning the used handkerchief.

*Magnesium Dioxide*.—According to an editorial in a recent number of the *Medical Record*, vol. 62, p. 139, a process for the manufacture of this compound has been evolved by Dr. Friederich Elias, of Berlin. The preparation itself is claimed to be capable of emitting a large amount of oxygen throughout the system.

*Biogen* is a trade name for what is claimed to be magnesium dioxide. This is being put on the market by an American firm. Whether or not it corresponds to the substance referred to above, the writer of this notice is unable to say.

In this connection, however, it may be interesting to note that from three to five parts, by weight, of solution of hydrogen dioxide, may be added to one part by weight of light calcined magnesia without decomposition. The resulting mixture may be dried and subsequently powdered, retaining from 60 to 80 per cent. of the contained oxygen. The resulting powder retains the oxygen without any appreciable loss. Some specimens of this mixture, made upward of four months ago, still give the characteristic blue coloration on the addition of dilute sulphuric acid and solution of a bichromate salt.

*Hydrogen Dioxide* in a crystalline form has been obtained by W. Staedel (*Zeitschr. f. angew. Chem.*, 1902) by cooling a 95 or 96

per cent. solution of hydrogen dioxide to minus 20 or 23 degrees centigrade. Despite the fact that this crystalline compound combines with explosive violence with readily oxydizable materials, it appears to be quite stable under favorable conditions.

*Microcidin* (Sodium naphtholate). Belioz (*Jour. des Practiciens*) has used this for several years and considers it a powerful antiseptic. It may be made according to the following formula :

Naphtol B . . . . .	25
Liquid caustic soda, 30 per cent. . . . .	40
Distilled water . . . . .	40

Mix the soda solution and water and dissolve the naphtol by aid of heat. Evaporate to dryness. The resulting powder is white or nearly white, and freely soluble in water. As an antiseptic it is said to be used in solutions of from three to five parts in a thousand.

*Opium*.—According to Gehe & Co.'s "Handelsberichte" this drug is being systematically and extensively adulterated. It appears that there are two distinct varieties of opium—the soft or manufacturers opium, used largely for the production of opium alkaloids, is usually sold by units of assay; while the other, that is known as Smyrna or druggists opium, if it meets the particular pharmacopœial requirement for morphine, has other points of favor beside the total alkaloidal content. It is this latter grade of opium that is being systematically cheapened by the admixture of either cheaper grades of opium; or where this will not reduce the morphine strength sufficiently, or is not readily available, the opium is cheapened by the addition of wheat-flour or powdered poppy heads. It is then worked over into cakes and wrapped in poppy leaves, like the original. Von Vogl, in calling attention to this same fact, states that he had seen a sample of opium in which the adulterant had evidently been an inferior grade of gum arabic or gum tragacanth.

*Pancreone*.—This substance is a reddish-gray powder, nearly or quite tasteless, insoluble in water or dilute acids, but freely soluble in faintly alkaline media. It is obtained by the action of tannin on pancreatin, and is said to be capable of withstanding the action of the gastric juices without injury, becoming active, however, in the alkaline fluids of the intestines. It is given in doses of from 0.10 to 0.50 in the form of powder, cachet or tablet (*Muench. Med. Woch.*)

*Pulmoform* is the name given to methyl guaiacol, or a combination of formaldehyde and guaiacol. Said to be odorless and tasteless



and may be given in doses of 0.5 to 1.0 four or five times a day.

*Pulmin* is the corresponding combination of creosote and formaldehyde. This is said to be a yellowish powder without odor or taste and may be given in the same size doses as pulmoform (*Phar. Centralk*).

*Quinine*, according to Dr. H. Marx (*Muench. Med. Woch.*, 1902), is a more efficient antiseptic than carbolic acid. He recommends the use of a 1 per cent. solution made up as follows:

5. Quinine hydrochlorate.  
15. Alcohol.  
480. Water.

Warm slightly before using so as to have the quinine in complete solution. In addition to the antiseptic properties, this solution is also said to be styptic and deodorizing.

*Rheumatin*, the salicylate of salicylic-acid-ester of quinine, is a white powder sparingly soluble in water. As its trade name would indicate, it is being recommended as a specific in cases of rheumatism, given in doses of 1.00 three or four times a day.

*Salochinin*, the salicylic-acid-ester of quinine, is being recommended as a tasteless substitute for quinine. According to the published reports, the active dose is from 1.00 to 3.00 daily.

*Rhubarb*.—Tschirch and Heuberger, in an advance note (*Schweiz. Wochs. f. Chem. u. Phar.*, 1902, p. 282) announce that they have made an elaborate analysis of rhubarb. They find among the substances that need not be considered in connection with the physiologically active bodies contained in this drug, a pectin-like body (*Cholestrin*), some gallic acid, and a dextro-rotatory sugar.

Of the pharmacologically active ingredients they recognize two groups of glucosides: (1) A tannoglucoside (rheotannoglucoside); (2) an anthraglucoside (rheoanthraglucoside). These glucosides are always accompanied by their decomposition products, and are separated with difficulty. Among the decomposition products of anthraglucoside the authors consider chrysophanic acid, methyl ether rheum emodin and rhein.

*Sodium Carbonate*.—Gehe & Co., in their "Handelsberichte" for April, 1902, report an interesting fact in reference to this salt. It appears that the Aztecs of Mexico and Central America used sodium carbonate to facilitate washing long before the discovery of Mexico by the white man. Sodium carbonate occurs native in sev-

eral springs and inland lakes of Mexico, and at the present time is being produced in commercial quantities by several concerns.

*Sucramine*.—A new sweetening agent. Bellier (*Bull. Gen. de Therap.*) finds that sucramine is very soluble in water, slightly soluble in alcohol, completely insoluble in ether, acetone and benzin, neutral in reaction and leaves no residue after combustion in air. By boiling an aqueous solution of sucramine with magnesia, considerable ammonia is formed; this, in connection with other physical characteristics, lead the writer to believe that the substance is simply an ammoniacal salt of benzoic sulfamid or saccharin.

*Sugar*.—Some idea of the amount of research that has been done on this useful as well as interesting organic compound may be had from an examination of a paper on the chemical tests for sugar by M. Duyk (*Bull. de la Soc. Royale de Phar. de Bruxelles*, No. 3, 1902). In this paper the author has gathered the names and formulas for the principal reagents for sugar. Upwards of eighty-five names of tests and the accompanying formulas are given in this paper alone.

*Tannin*.—According to Dr. Calmetto (*Zeitschr. f. angew. Chem.*, 1902) tannin may be entirely converted into gallic acid by introducing into a solution a pure culture of a fungi, *Aspergillus gallomyces*.

*Tincture of Iodine*.—E. Beuttner (*Schweiz. Wochschr. f. Chem. u. Phar.*) gives a lengthy account of some experiments that he has been conducting as to the percentage of loss of free iodine and the factors that enter most largely into the decomposition. He finds that heat promotes decomposition more rapidly than access of air or light. From his investigations he concludes that tincture of iodine should be made only in small quantities, and should not be kept on hand.

*Upol*, a compound of urea and quinic acid, is employed in uric acid diathesis, given in doses of 2.00 to 5.00 (*Therap. Month.*, 1902).

*Valyl*—diethylamid-valerianate—has been used in cases of hysteria, neurasthenia, hypochondria, hæmacrania and neuralgia. On account of the disagreeable taste and odor, it is mixed with suet and dispensed in gelatine capsules. Given in doses of about 0.10 three times a day (*Therapie der Gegenwart*, 1902).

*Wax*.—A case of extensive adulteration is reported by R. Berg (*Chem. Zeit.*, 1902, p. 310) who reports finding a large consignment from Haifa, in Syria, to be composed approximately of 46.7 parts of beeswax, 11.7 ceresin, 38.8 rye-flour and 2.8 of moisture.

## RECENT LITERATURE RELATING TO PHARMACY.

### EXTRACT OF ERGOT.<sup>1</sup>

It is not in accordance with the present state of our knowledge of the active principles of ergot, says Meulenhoff, that Ergotine Bonjean maintains such a prominent position. It contains a very unsatisfactory proportion of those principles. This was, of course, not known when Bonjean published his researches on ergot, in 1841, and recommended his preparation to the medical profession. The German Pharmacopœia seems to have acknowledged this fact and introduced, side by side, with Bonjean's preparation, a formula for an extract of its own. The Swiss Pharmacopœia has rejected Bonjean altogether.

Neither preparation deserves to be recommended. Ergot cannot be thoroughly exhausted of its alkaloid by the use of acidulated water, nor by percolation with alcohol of 20 per cent., nor by alcohol of 20 per cent. to which acetic acid is added, nor by alcohol of 42 per cent. Alcohol of 70 per cent. exhausts it thoroughly. There is no necessity to deprive ergot of its fat, of which it contains on an average 35 per cent. This does not affect its therapeutic value. This is in contradiction to a statement by Grover, in our editor's article on "Cheap Drugs," line 3 from below on page 319, July number of this JOURNAL. Meulenhoff proves his standpoint by a great amount of figures, for which the interested reader is referred to the original paper.  $H_2SO_4$  is preferable over any other acid in connection with ergot, because ergotine sulfate has the greatest solubility of all the other alkaloidal salts. It is not quite clear why the Ph.G. adds HCl to its percolate. It cannot be to separate sclererythrine, because the percolate is not filtered after the addition of the acid, nor to keep alkaloids in solution which are not there.

An assay method is based upon making an acidulated aqueous exhaustion alkaline with ammonia and shaking out with ethylic ether. Keller's MgO has no advantage over  $NH_3$ . The residue of the ethereal exhaustion is afterwards redissolved in acidulated water, whereby some decomposition products remain behind; these are separated, the fluid is made alkaline again and shaken out with ethylic

<sup>1</sup> The original pamphlet, by Dr. J. D. Meulenhoff, consists of 35 closely printed pages, and is reprinted from the *Pharm. Weekblad*, for March, 1902.

ether for a second time.<sup>1</sup> This brings the yield of purified alkaloid to about 0.1 per cent. (one-tenth).

The ergot used was chiefly of Russian origin. [Ref. used once ergot collected in Wisconsin, of good quality.] It is of the greatest importance for a thorough exhaustion that the powdered ergot [B 30 of the Dutch Pharmacopœia—60 would do in the U. S.—Ref.] is moistened with one-third of its weight of the alcohol before percolation.

A slow evaporation, even when the distillation of the percolate is conducted in vacuo, is objectionable. It involves a loss of alkaloid. [The author speaks of a temperature of 56° C. This is, of course, not the temperature whereby alcohol can be distilled in vacuo. With the pressure of city water I succeeded always to distil the alcohol from a percolate at or near 18° C., but for the evaporation of the remaining aqueous fluid I would recommend the introduction in the pharmaceutical laboratory of vacuum apparatus combined with stirring apparatus, which are common elsewhere (manufacturing of sugar, tannin, glucosides in general). E. A. Lenth, Berlin, Germany, shows them in his catalogue on page 26, for pharmaceutical purposes. Ref.]

Extract of ergot deteriorates. [I have no figures if a fluid extract does. But are not the therapeutic effects of ergot very oscillating? Ref.]

J. B. N.

#### THE CHEMISTRY OF CANNABIS INDICA.

According to Humphrey (*Pharm. Jour.*, May 3, 1902) three products are obtained in India from the female plants of *Cannabis sativa*, Linné. The dried and crushed leaves are known as "bhang," and the compressed and flowering tops as "ganja." A resinous secretion exudes from the leaves and bracts, and during the preparation of "ganja" some of this separates in the form of a grayish powder, which, when mixed with an extract of the plant, is known as "charas," this latter product being used for smoking. The best charas, however, consists of resin collected from the flowering tops. "Ganja" also varies in quality. The best grade is produced in Bengal, and consists of the dried and compressed flowering tops of female plants which have not been fertilized, as it has been found

<sup>1</sup> A process with which readers of "Lyons' Manual" for pharmaceutical assaying are familiar enough to save the translation of details given by Meulenhoff. Ref.

that the secretion of resin is increased if the formation of seed be prevented. The drug which is official in the British Pharmacopœia is the Bombay ganja, and as this may consist of either flowering or fruiting tops, is likely to be of inferior quality.

A number of investigators have reported the presence of alkaloidal substance in this drug, but the author is of the opinion that what they found was either choline, or a decomposition product of it, as was pointed out by Jahns, who first isolated choline from the drug. This principle is a strong base, crystallizes with difficulty, and is not infrequently found in plants. By the action of caustic alkalies it can be converted into trimethylamine, which also occurs naturally in some plants.

The volatile oil of Indian hemp, which consists principally of a sesquiterpene (cannabene) and paraffin, has also been the subject of considerable investigation, but the experiments on animals in 1886, by Roux, proved it to be inactive.

The most important constituent of the drug appears to be the resin, which constitutes the greater part of charas of good quality. From charas, Wood, Spivey and Easterfield obtained (*Four. Chem. Soc.*, 69 [i], 539), a terpene, a sesquiterpene, a crystalline paraffin and 33 per cent. of a toxic red oil having the formula  $C_{18}H_{24}O_2$ , and to which they gave the name cannabinol. This they regarded as the only active constituent of the resin. Further study, however, showed (*Four. Chem. Soc.*, 75, 20) that this red oil or crude cannabinol was a mixture of two compounds having similar physical properties, only one of which has been isolated, and for which the name cannabinol has been retained. It has the formula  $C_{21}H_{36}O_2$  and is obtained by distillation of an ether extract under diminished pressure, the distillate forming a transparent brownish resin when cool. When administered in very small doses, this pure cannabinol produces the toxic effects characteristic of Indian hemp, and, as stated by the author, there is little reason to doubt that it is the active principle of the drug.

In discussing the subject of the active principle of this drug and the cause of its loss of activity, Professor Marshall states (*Pharm. Jour.*, May 3, 1902, p. 362) that the active principle is undoubtedly of a resinous character, and that although the presence of alkaloids has been reported by various investigators, none of them possessed the physiological properties peculiar to the drug itself. Professor

Marshall also calls attention to the work of Wood, Spivey and Easterfield on charas, in which they found no alkaloid whatever.

Having observed that when cannabinol is left exposed to the air in a test tube it gradually darkens, commencing on the surface, the author instituted a series of experiments, which not only showed that this darkening is due to oxidation but that the activity of cannabinol is thereby impaired. He therefore infers that the loss of activity of Indian hemp is due to oxidation of the active ingredient, although oxidation of the terpene may also have something to do with the deterioration of the drug. As a result of his observations the author advises keeping cannabis preparations well protected from the air, and if they are to be kept for any length of time, hermetically sealed packages are to be preferred. In this connection he states that many of the accidents which occur in practice are probably due to the difference in activity between surface layers of the preparation and those lower down, or to the difference between recent preparations and those that are old and inert from exposure.

F. Y.

#### THE NATURE OF PEPSIN.

The veil of mystery which has enshrouded the subject of enzymotic processes in the human body is beginning to fall beneath the hands of careful investigators. That the pepsin usually obtained from the gastric juice and mucous membrane of various animals is not the essential enzyme, but contains this mixed with a number of impurities, is conclusively shown by the latest researches of C. A. Pekelharing (*Hoppe-Seyler's Zift. f. Physiol. Chemie*, March 20, 1902). In spite of laborious investigation he did not succeed in obtaining from the gastric mucous membrane a proteolytic enzyme of constant composition. In hundreds of preparations obtained from pigs' stomachs, which preparations had been submitted to repeated processes of purification, it was found that the nitrogen and hydrogen content were in each case respectively constant, whereas the carbon and particularly the phosphorus content were subject to variation, which indicated the presence of impurities. The longer the process of purification was carried out, the smaller was the proportion of phosphorus obtained. He was even able to obtain a pepsin that was phosphorus-free. The author does not deny the possibility that pepsin occurs in the gastric-juice in combination with lecithin, nevertheless he asserts that the activity of the enzyme is independent

of the existence of lecithin or of any other phosphorus-containing substance. It was discovered that the mucus with which preparations of gastric juice were contaminated contained a proteid of which phosphorus is one of the constituents. The author agrees with Friedenthal that the proteid body precipitated from solutions of pepsin by heat contains a carbohydrate as well as a pentose molecule. Pekelharing was able to study to better advantage a substance obtained from the mass precipitated by heat, which substance possesses the properties of an acid, soluble in water on the careful addition of an alkali. For this substance the author proposes the name "pepsin-acid," and has learned to recognize it as one of the splitting-products of pepsin. This body belongs to the class of proteids corresponding with other members of this class, both in the nature and the respective proportions of its constituents, and differing from the entire mass precipitated from solutions of pepsin by heat only in respect to the proportion of sulphur. Pepsin prepared from the gastric mucous membrane of the pig and that prepared from the gastric juice of the dog may be placed in the same category. The differences between them may be ascribed to the difficulty with which pepsin is extracted from the mucous membrane in its pure form. Both varieties are, like all the other proteids, levorotatory, but there is no relation between the amount of rotation of the plane of light and the reaction of the solution. According to the author, the fact that the substance obtained from the mucous membrane possesses sufficient purity for a proteid body indicates that this exceptionally active pepsin is the enzyme *per se*, and does not owe its digestive power to the presence of associated bodies. In the first place, the activity of pepsin is destroyed by heat and at the same temperature as that at which albumin is coagulated. In the second place, as soon as gastric juice is deprived of its albuminous constituent through semi-saturation with ammonium sulphate, it loses its zymotic power. Moreover, the presence of ammonium sulphate is to a large degree inhibitory to the activity of pepsin. It has previously been shown by the author, and later by Nencki and Sieber, that it is possible to prepare active solutions of pepsin that do not give the reactions for proteid bodies; this fact, according to the author, does not negate the idea that pepsin is an albuminous body. The observers just mentioned have advanced certain facts in favor of the proposition that it is possible for the same molecule to dis-

play diverse zymotic activities. Without adding anything to this contention, the author inclines to the view of Fisher, as presented in the following metaphor: There are keys constructed in the form of a ring to which are attached side-branches, each one of which fits a different lock. Let one or more of these attachments be bent, or in any other way incapacitated, the remaining branches will nevertheless retain their peculiar property.—*Med. News*, 1902, p. 1081.

#### CERTIFIED MILK.

It is by no means generally known that the term "certified milk" originated in New Jersey with the Essex County Medical Commission, in 1893. This commission was organized for furnishing the medical profession with a milk properly prepared and properly handled, suitable for clinical purposes. The eighteenth report of this commission, which has just been received, demonstrates how stringently the dairyman, with whom their contract was made nine years ago, has adhered to the standards required, the milk showing the lack of micro-organisms in large numbers and the entire absence of pathogenic varieties; an unvarying resistance to early fermentative changes, so that it may be kept under ordinary conditions without extraordinary care; and a constant nutritive value of known chemical composition, with a uniform relation between the percentage of fats, proteids and carbohydrates. A chemist, bacteriologist, physician and three veterinarians are employed by the commission to regulate matters of hygiene, sanitation, etc. The buildings on the farm are well constructed, drained and ventilated; the fodder, which is of exceptional quality, is kept apart from all sources of contamination; there is a good water supply; and everything is kept scrupulously clean continually. There are no stagnant pools in the neighborhood; no fowl, hogs, horses or other live stock on the farm; no sick or excited cows; and no animal bred through consanguinity within a period of three generations. The stables are so frequently cleaned that no animal odors are noticeable. The cows are thoroughly milked in a clean building, after their udders have been cleaned, and the milker, having put on clean overalls, has washed his hands.

The milk is at once transferred to sterilized, dry cooling cans, after passing through a sieve with no less than 100 meshes to the linear inch. The milk is cooled in a separate building, to between



40° and 50° F., inside of forty-five minutes after milking. It is then packed in glass jars, which have been cleansed and sterilized, and is hermetically sealed. These are ready for shipment and are delivered before the milk is twenty-four hours old. Montreal, New York, Philadelphia and other cities of the United States have taken this commission for a model and now produce "certified milk" prepared upon the same lines. The next generation will be able to look back with amazement upon the methods now prevalent for the destruction of the bacteria in milk, pasteurization and sterilization of the milk, both undoubtedly harmful procedures which will have become useless by the progress of cleanliness alone.—*Phila. Med. Four.*, 1902, p. 992.

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### CORRESPONDENCE.

DEAR SIR :

In examining some old certificates of membership in the College of Apothecaries, which have lately come into the possession of the College, two of them issued in 1821, the year when the College was organized, I observed above the sketch of a laboratory on the certificate a legend which differs somewhat from that on the certificate now in use by our College. It reads thus, "*Quem scit uterque exerceat artem*"—the translation of which is, "Let each one practise the art which he knows." In the year following, 1822, the title of our College was adopted and the act of incorporation secured. The committee who were charged with the duty of having the certificate altered to correspond with the corporate name, had the legend changed to a quotation from one of Cicero's writings, and it reads, "*Quam quisque novit artem in hac se exerceat*"—the translation of which is, "Let each one exercise himself in the art which he knows."

It is to be regretted that some one did not take up this subject before all of those earnest busy workers for the good of humanity and our profession, who were instrumental in securing our charter, revising the certificate and settling the principles which have resulted in so great a success as our present condition shows, are gone.

One other fact should be noted in connection with these legends on our certificates—that they all point to the importance which the organizers of our College attached to the *educational qualification* of those who should become members of the profession and associates in the College work.

This is so well shown by the legends.

(1) Let each one work in the business he knows.

(2) Let each one exercise himself in the art which he knows.

(3) The legend of the seal, which goes further and tells the members that it is *safety* to know all these things.

Let us all heed the lessons that the worthy pioneers of pharmacy so wisely planned and worked so earnestly to carry out their plans when organizing our College; then our present pharmacists will live in the kind remembrances of their successors when they have left their active labors to younger hands.

THOMAS S. WIEGAND.

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## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

"First Book of Qualitative Chemistry," for studies of water solution and mass action. By Albert B. Prescott and Eugene C. Sullivan. Eleventh edition, entirely rewritten. New York: D. Van Nostrand Company, 1902. Price, \$1.50.

The first edition of Prescott's "First Book of Qualitative Chemistry" appeared in 1879. The successive editions were favorably received by students of chemistry in the high schools, colleges and universities, as the work not only contained the information the students desired, but it was clear and concise and free from any ambiguity. The objective point of the author was not that the student might only secure the results and carry on analysis, but that primarily he might have "a personal acquaintance with the character of the chemical elements and with the nature of chemical change."

The eleventh edition contains all of the valuable features of the earlier editions, in that the grouping of the elements is according to the Periodic System, and the composition of materials occurring in daily life are given in a large number of instances. In addition, the work has incorporated in it the results of the fundamental researches of Ostwald in inorganic and analytical chemistry.

*The Chemistry of the Terpenes.* By F. Heusler. Authorized translation by Francis J. Pond. Carefully revised, enlarged and corrected. Philadelphia: P. Blakiston's Son & Co., 1902. Price, \$4.00.

The study of the chemistry of volatile oils has attracted the attention of chemists, botanists and pharmacists for years. During the last twenty years Wallach and others have developed by their

methods of research order out of the chaos, and the result has been an interest in the study of volatile oils that is probably not superseded by that of any other plant constituent. The works of Bornemann on ethereal oils, and of Heusler on the terpenes, paved the way for the student as well as specialist to survey the results of numerous investigators and comprehend their real import. The publication of the American edition of Gildemeister and Hoffmann's work on the ethereal oils by Edward Kremers, and now the translation of Heusler's work on the terpenes, by Francis J. Pond, are particularly welcome additions to English chemical literature.

The following subjects are treated: Hemiterpenes; terpenes proper,  $C_{10}H_{16}$ ; hydrocarbons,  $C_{10}H_{18}$ ; hydrocarbons,  $C_{10}H_{20}$ ; oxidized compounds related to the terpenes  $C_{10}H_{20}$ , which are further divided according to those which may be regarded as derivatives of the hydrocymenes as carvone, and those which are analogues of pinene, camphene and fenchene, as camphor, etc.; amido-derivatives of the terpenes; amido-derivatives of phellandrene; olefinic members of the terpene series; and sesquiterpenes and polyterpenes.

The original work of Heusler has been considerably enlarged by the review of the numerous contributions on the terpenes which have appeared since the original German edition was published in 1896.

BULLETIN OF THE LLOYD LIBRARY OF BOTANY, PHARMACY AND MATERIA MEDICA. By J. U. and C. G. Lloyd. Pharmacy Series, No. 1. Cincinnati, O.: 1902.

This is the fourth bulletin from the Lloyd Library, and is devoted to "References to Capillarity" to the end of the year 1900, being Chapter VII of "A Study in Pharmacy," by John Uri Lloyd. The references were collected and abstracted under the auspices of Professor Lloyd by Dr. Sigmund Waldbott, Librarian of the Lloyd Library.

For more than ten years Professor Lloyd has been interested in capillary phenomena, particularly in what he has termed the "pendent drop" that is observed on shaking a mixture of chloroform and water. This study led to certain investigations which involve the contact lines between liquids. These results will be recorded now that the references are completed. The whole subject is one fraught with interest, and physicists as well as scientists generally will be pleased to know that Professor Lloyd has continued his

researches so persistently and will eagerly await the succeeding parts.

THE PHARMACOPŒIA OF THE GERMAN HOSPITAL OF THE CITY OF PHILADELPHIA, including formulas for all stock preparations and the average doses of all the drugs, chemicals and preparations usually dispensed at the German Hospital Pharmacy. Compiled for and published by the Board of Trustees. Philadelphia, 1902.

When one considers the high character of the work carried on at the German Hospital and the fact that many of the leading hospitals have published formularies for years, some of which have gone through a number of editions, it is a matter of surprise that the German Hospital has not ere this published the work at hand. The Pharmacopœia of the German Hospital contains a list not only of the drugs of the U. S. Pharmacopœia which are employed in the German Hospital, but many of the newer synthetic remedies and a large number of formulas that have been designed to replace, or to be used instead of, some of the more popular so-called proprietary preparations. In addition to these there are also a number of formulas for various preparations, or stock medicines, that have been in use at the German Hospital for upwards of ten years, the efficacy of which has been sufficiently demonstrated to entitle them to continued use.

One particularly commendable feature of this formulary is that the quantities used in all preparations, as well as doses, are given in the metric system exclusively. Medicine-glasses are used in the hospital in which approximate metric equivalents of spoonfuls are indicated. A goodly portion of the preface is devoted to the consideration of the important subject of posology. Inasmuch as "all medicines are more or less active agents, and it is possible for even the most simple and harmless drug to produce startling and sometimes serious secondary effects," the nurse of the hospital is expected to be on the lookout for the latter and report promptly to the physician. Too much attention cannot be given to this phase of the subject of posology, as doses like definitions of poisons (see this JOURNAL, 1898, p. 527) have not as yet been successfully defined.

This work contains, beside a number of valuable features on general directions in the treatment of poisoning, a table of maximum doses of potent remedies, giving maximum single doses as well as maximum amount that may be given for twenty-four hours.

Both pharmacists and physicians will find the work useful and suggestive.

PRACTICAL METHODS OF URINE-ANALYSIS, for Chemists and Druggists, with Notes on the Composition of the Normal and Abnormal Secretions. Second and enlarged edition. Published at the offices of *The Chemist and Druggist*, 42 Cannon Street, London, E. C. Branch offices: Adelaide, Melbourne and Sydney, Australia; and New York, U.S.A., 1902. Price, 2s. 6d. net.

It matters not whether boards of health in some localities carry on analyses for physicians free of charge or whether some physicians consider it to be beyond the province of the pharmacist to conduct such analyses when he asks a reasonable recompense for his services, the fact remains that reputable pharmacists are in some instances doing this work for physicians and are being paid for it. There are several reasons why the pharmacist is usually a proper person to do this work. Urinalysis is an analytical piece of work, and the graduates of colleges of pharmacy are trained analysts. Chemical analyses, pharmaceutical assays and microscopical manipulations he performs daily during his college work. These are to the pharmacist of primary consideration, and while the physician may receive a certain amount of instruction in these branches, the work is all secondary to the practice of medicine with its multiplicity of other details with which he is engrossed. Urinalysis and blood-examinations are an aid in his diagnoses. These require the time that the physician needs for attending to his office practice or at the bedside of the patient. The busy practitioner does not usually attend to his practice and carry on his analyses any more than he compounds his own medicine. These things he delegates to the pharmacist whom he has learned is competent and trustworthy.

There are many works on the examination of the urine, nearly all of which are written from the viewpoint of the physician. The present book is written for the pharmacist and is a clear and concise treatment of the essentials that are necessary for everyday work in analysis. The following are the subjects treated: Urine in health and disease, referring to composition, collection of sample, daily quantity, physical appearances, reaction, specific gravity and solids; chemical analysis of urine; analysis of abnormal constituents; microscopical examination; optical examination; miscellaneous

matters, including special reagents, report on sample, etc. The work is to be commended to pharmacists and chemists, as the subject is considered, we believe, with the right end in view, viz., the analysis of urine and not so much what these analyses indicate, this belonging essentially to the province of the physician, with whom the results of urinalysis is but one of several factors leading to the diagnosis of disease.

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### OBITUARY.

Mr. Chas. W. Warrington, an active member of this College, died suddenly on the morning of November 13, 1901, in the residence attached to his store, S. W. corner Seventeenth and Mt. Vernon Streets. Mr. Warrington was born near Moorestown, N. J., and came to Philadelphia in his youth to engage in the drug business. He graduated from the Philadelphia College of Pharmacy in 1876. A short time afterward he formed a partnership with Henry Trimble, under the firm name of Trimble & Warrington, in the wholesale and retail drug business. When Professor Trimble relinquished his commercial interests in the drug business the firm became Warrington & Pennypacker, and continued as such until 1897, when the firm purchased the store at Seventeenth and Mt. Vernon Streets, and in the year following the partnership was dissolved, Mr. Warrington continuing the retail business at this location. He was elected a member of the College of Pharmacy in 1900. He was a member of the Society of Friends and a man of correct habits and quiet, unassuming demeanor. He is survived by a widow, a daughter, and two sons.

Henry C. C. Maisch, Ph.D., died at his residence in Philadelphia, July 1, 1901. He was the oldest son of the late Prof. John M. Maisch, and was born in Brooklyn, in 1865. He graduated from the Philadelphia College of Pharmacy in 1885 and then went abroad for several years, continuing his studies at Göttingen University, Germany, receiving his degree of Doctor of Philosophy from that institution in 1889. Returning to America, he was engaged as a demonstrator and assistant professor at Clark University, Worcester, Mass. He left there to assume a professorship in the Illinois College, at Chicago. For a short time he engaged in a Louisville, Ky., pharmacy, but in 1893 he returned to Philadelphia and decided to

make it his permanent home. Purchasing a store at Tenth and Ogden Streets he engaged in the retail drug business. During his father's protracted illness, just prior to his decease, he assisted Professor Maisch in editing the *AMERICAN JOURNAL OF PHARMACY*. He revised the recent editions of Maisch's "*Organic Materia Medica*" and the "*National Dispensatory*," both recognized as authoritative works, written by his illustrious father. The scientific attainments of Henry C. C. Maisch were not appreciated in the limited scope of his retail drug store, and this venture not proving successful, he disposed of the store and engaged as chemist in the pharmaceutical laboratories of Hance Brothers & White. For several years he was Professor of *Materia Medica* and Botany in the Medico-Chirurgical College, but had resigned this position the year before his decease. Dr. Maisch had contributed to pharmaceutical literature a number of papers of practical value. His decease was due to appendicitis, operation probably having been delayed too long. He was a member of the American Pharmaceutical Association and of several prominent German organizations.

G. M. B.

CHARLES MOHR.

Dr. Charles Mohr, whose death occurred at Asheville, N. C., on July 17, 1901, was well known in pharmaceutical as well as botanical circles.

Dr. Mohr was born in Esslingen, Württemberg, December 28, 1824. In 1842 he entered the Polytechnical School at Stuttgart, and after three years of study he accompanied the naturalist, Kappeler, to Dutch Guiana, but, owing to attacks of malarial fever and other disappointments, he soon returned and found employment at the chemical works of Brunin, in Moravia. In 1848 these works were closed as a result of the political agitations in Germany, and being attracted by the republican form of government, he came to the United States at about the same time as the political refugees from Germany, although he was not regarded as one of them.

The following year, as a forty-niner, we find him in California, where instead of enriching himself by the collection of nuggets of gold, he made a large collection of plants in Central California, but which, together with his collections made later in the Isthmus of Panama, were stolen from him. In addition to this misfortune he

nearly lost his life from Chagres fever. Later we find him making valuable collections of mosses in Mexico, after having temporarily settled in Louisville, Ky. On account of the political revolution in Mexico he returned to the United States and settled in Mobile, Ala., at the time of the Civil War. Here he developed the native *materia medica*, manufactured medicinal preparations for supplying the Confederates, and made for himself a reputation as an analyst. For many years thereafter he was a successful manufacturing pharmacist, devoting his spare time to studying the flora and natural resources of Alabama.

While Dr. Mohr contributed a limited number of papers to the pharmaceutical journals, and was a member of the Pharmacopœial Revision Committee in 1890, still his reputation rests mainly on his botanical studies, especially those relating to the plant life of Alabama and the forestry of the South. He was employed by the Government in 1880 to investigate the forests of the Gulf States, in connection with the work of the Tenth Census, and examined the forests from Georgia to southwestern Texas, obtaining valuable information, and thus placing himself among the pioneers in forestry work in this country. The Appalachian National Park Association, which has under consideration the "Southern Appalachian Forest Reserve," would honor itself by associating the name of Dr. Mohr with some phase of the work which they are promulgating.

Dr. Mohr was not only engaged in the Forestry Division of the U. S. Department of Agriculture, but was the botanist of the Geological Survey of Alabama, and made collections of southern woods for the Jessup Collection of North American woods in the American Museum of Natural History in New York City, and for the New Orleans Exposition. He also wrote numerous papers upon the botany and geology of the Southern States.

Dr. Mohr was awarded the degree of Ph.D. by the University of Alabama, and was an honorary member of many pharmaceutical and scientific societies, among the former of which we mention the Philadelphia College of Pharmacy.

While the earlier career of Dr. Mohr was fraught with disappointments and discouragements, still these no doubt helped to strengthen his character and to fit him for his life-work—his work being as permanent as the latter years of his life were fruitful and happy. A wife and five children survive him.

H. K.



# THE AMERICAN JOURNAL OF PHARMACY

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OCTOBER, 1902.

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## THE FATHER OF AMERICAN PHARMACY.<sup>1</sup>

WILLIAM PROCTER, JR.; BORN, BALTIMORE, MD., MAY 3, 1817; DIED,  
PHILADELPHIA, PA., FEBRUARY 9, 1874.

BY ALBERT E. EBERT, PH.M.

To compose a eulogy of the life and work of Professor Procter is a pleasure to which an old-time pharmacist should bring his best thought. But this has already been done by abler minds than mine. It may not, however, be a work of supererogation to add another tribute to his memory as a teacher, a writer and as the founder and leading spirit of the American Pharmaceutical Association. With but a limited education, yet by hard and unremitting labor and study he placed himself in the front rank of American scholars. He built his life, line upon line, by his own unaided efforts. He was a self-made man in the best sense, for his own early struggles had taught him to put himself in another's place, and to give the help he in former years would have been glad to receive. From the day of his graduation from the Philadelphia College of Pharmacy in 1837 his life seemed to be devoted wholly to the interests of the profession. In 1840 he became a member of the college from which he graduated, and from that time to the end of his life he was one of its most distinguished sons. When he became a professor in the college he founded the course in the theory and practice of pharmacy, which, prior to its introduction by him, had not been practically applied. His contributions to the literature of pharmacy

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<sup>1</sup> Read at the Special Jubilee Session of the American Pharmaceutical Association, September 11, 1902.

have been greater than those of any other American; for more than a score of years he was editor of the *AMERICAN JOURNAL OF PHARMACY*, and the breadth of his researches and the conscientious accuracy with which he discharged the duties of that position are attested by the volumes of the *JOURNAL* which appeared during the years of his incumbency. Professor Procter was extremely conscientious in his giving credit to every writer and investigator who had contributed to the advancement of pharmacy. As editor he scrutinized with care every paper submitted, and his wide knowledge of everything pertaining to the profession enabled him to prevent errors and to give to every man exact credit for whatever originality he might possess. He never gave willingly to one man credit for work that belonged to another, nor did he allow any investigator to claim the work of another man as original with himself.

Professor Procter was a member of the Society of Friends. He was a man of unusually pure mind and character. He had the rare faculty of being able to concentrate his mind amid the pressure of a multitude of distracting circumstances, and in this way he was able to accomplish wonderful results. He was ever genial, even of temper and unruffled by any of the cares of his college or professional life. He was a man of truly rare and excellent heart, with a mind so great and so richly endowed with learning that such another has not yet been born to fill his place.

The American Pharmaceutical Association was the offspring of Professor Procter's able and versatile mind. Throughout the years of his life which followed the organization of that body, he gave to it the richest treasures of an intellect fitted beyond all others for the work which he had undertaken.

It was in October, 1851, that Professor Procter, with Charles Ellis and Alfred B. Taylor, went as delegates to a meeting in New York called by the New York College of Pharmacy to consider a law relating to the inspection of drugs at the Custom House. At this gathering was born the idea of a national association, and Professor Procter was the first to grasp the true scope and utility of the idea. From this time until the time of his death, by voice and pen he contributed to the strength of the association.

His contributions to the annual proceedings of the association covered a wide and varied range of topics and were enriched by his large researches and by the versatility of his mind, which was to an

eminent degree that of the logician and the original investigator. His English style was pure, free from pedantry, and showed a rare simplicity and directness. His love and enthusiasm for the work of the association were among his most distinguishing characteristics. It is a great pleasure for me to remember him when I, as a student, knew him in his modest store in Philadelphia and during those rare days in Europe, when I had the pleasure of being his traveling companion for some months. I remember that it was Professor Procter's desire to attend a meeting of the British Pharmaceutical Conference, and at the time we were in Germany such a meeting was about to be held in Dundee, Scotland. The time of the meeting was almost coincident with that of the American Pharmaceutical Association, and, notwithstanding his strong desire to be present at the meeting of the British pharmacists, he nevertheless felt it his duty to return home and be present at the meeting of the American body. He requested me, however, to go on to Scotland and be present at the meeting of the British pharmacists. At the Dundee meeting the greatest regrets were expressed at the absence of Professor Procter, for among the British pharmacists his contributions were especially well known and his British friends looked forward with solicitude to a more personal and intimate acquaintance.

During our attendance at the International Pharmaceutical Congress in Paris, in 1867, Professor Procter was chairman of the United States delegation, and was made one of the vice-presidents of the congress. He was here the recipient of marked attentions from all of the most distinguished delegates, among whom his work and abilities were well known. The reception he received from such men as Anton von Waldheim, of Vienna; Dr. F. A. Flueckiger, of Switzerland; Dr. Cassellmann, of St. Petersburg; Dr. Dittrich, at Prague, and Professors Liebig, Wittstein and Buechner, at Munich, was most flattering.

The pharmacists of America ought not to let the memory of their most distinguished colleague fall into oblivion. They should keep the memory of William Procter, Jr., green in their hearts and should give him a monument more lasting than stone or bronze—a monument built in their affections and in the affections of those who come after them. Let us remember that the favorite child of his genius was the American Pharmaceutical Association. It was here that his work became as broad as his country.

As a teacher Professor Procter came in contact with a limited number of students; as editor of the AMERICAN JOURNAL OF PHARMACY his field, of course, was wider; but it was through his connection with the American Pharmaceutical Association that the scope of his labors became truly national in its character. This association owes to him more than to any other man. Could we ask him what, if anything, he would have us do as a memorial to him, he would undoubtedly answer that it would please him most for us to devise a way to perpetuate the life of the American Pharmaceutical Association. That, done in honor of his memory, would surely gratify him more than anything else we could do. We shall, no doubt, listen to a proposition for perpetuating the American Pharmaceutical Association in the name of William Procter, Jr., at this semi-centennial meeting. Whatever we can do in aid of a cause so worthy must be well done. For itself and in honor of the memory of its most distinguished founder, William Procter, Jr., the American Pharmaceutical Association deserves and must receive the most earnest, the most sincere and most affectionate thought of us all.

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## THE ADVANCES MADE IN PHARMACEUTICAL MANUFACTURES DURING THE PAST FIFTY YEARS.<sup>1</sup>

BY WILLIAM JAY SCHIEFFELIN.

In their scale of operations, in the use of machinery, and in the variety of their products, pharmaceutical manufactures have developed more during the past fifty years than through all the preceding centuries.

In 1852, when the medical world was emerging from the Jalap and Calomel age, the pharmacist made his own galenicals, pills and elixirs, and bought the crude drugs. Most of the manufactured products purchased by him came under the class of heavy chemicals and were of mineral origin. Besides the common acids, alkalies, alum and sulphur, the list included the mercurials, lunar caustic, arsenic and powder of Algaroth, sugar of lead, sulphate of zinc, magnesia, bromide and iodide of potash and Labarraque's solution.

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<sup>1</sup> Read at the Special Jubilee Session of the American Pharmaceutical Association, September 11, 1902.

Alkaloids and organic compounds were few and were used in very limited quantity. Morphine and quinine, chloroform, alcohol, ether and collodion, besides acetic, tartaric and oxalic acids, were the chief ones.

But in 1852 the opening of the Hudson River and Erie Railroads, followed by the Pennsylvania Railroad in 1854, made it possible for the druggist to get his preparations more quickly than he could make them, and at no greater cost; while the consolidation of fifty different telegraph companies, which began in 1851, enabled him to send his orders instantaneously.

The Civil War, with its demands for medical supplies, stimulated the manufacturers; the need of large quantities of pure extracts led Dr. Squibb to establish his laboratory, and the abilities of that great man were devoted to perfecting the processes of pharmaceutical manufactures.

His many researches and improvements, freely published in the *Ephemeris*, take the lead in importance and value, and he must be counted among the benefactors of humanity.

His process of preparing fluid extracts by cold repercolation may be put at the head, and his suggestions on the valuation of drugs and the assay of opium, on the manufacture of ether, acetone and cocaine, and of acetic extracts, should not be forgotten.

Among those who have passed away and who should be remembered with honor and gratitude for their services to scientific pharmacy in America, are Procter, Maisch and Rice. These men made the United States Pharmacopœia the most perfect book of its kind in the world.

The Pharmacopœia, with its formulæ constructed on a scale intended for the convenience of the retailer, became nevertheless a guide to the manufacturer, and the retailer found it advantageous to buy his standard pharmaceuticals ready made. The reasons for this are truer to-day than they were then; they are as follows:

(1) The retail pharmacist cannot devote the time to manufacturing.

(2) Making fluid extracts in small quantities is uneconomical because of the loss of the alcohol which is recovered in a large way; the cost of labor, which would be about the same for one litre as for 200 litres; and the forming of a deposit in many extracts which would never have time to clarify if used at once for dispensing;

then the standardization of alkaloidal extracts would greatly increase the cost of one litre, but not of 200.

(3) It is very evident that 1,000,000 pills or tablets can be more cheaply made than 100, and it is extremely convenient to have pills and tablets of a given formula all of one size with the materials evenly distributed. The retailer demands and receives liquid preparations which remain clear and emulsions that do not separate; it may be doubted if this would always be the case if he made them himself. Therefore the large manufacturing plants of to-day have developed. Fifty years ago the manufacturers supplied small quantities of morphine, chloroform, ether, galenical extracts, elixirs, opodeldoc, mercurial and other salts. Ten years later the list of fluid extracts had greatly increased; while in 1870 extracts with glycerin were in favor. Then the coated pills were introduced and the business increased to very large proportions until the cheaper tablets and triturates partially replaced them.

In 1857 a paper was read before the American Pharmaceutical Association mentioning gelatine capsules, sugar-coated pills, cod-liver oil emulsion, and the effervescing salts which Mr. Maisch had described the year before: it is remarkable that so many years passed before all these came into general use. The soft gelatine capsule is one of the greatest improvements in administering drugs that has been made.

In 1885 the synthetic remedies were introduced from Germany. Antipyrine was soon followed by acetanilid, phenacetine, sulfonal and many others. Our schools of science awoke to the value of research work when the learned and patient Germans produced these preparations.

The English and French chemists had supplied scarcely any synthetic remedies, and so the backwardness of the Americans would not have excited much comment, were it not that certain persons put on the market mixtures containing chiefly acetanilid, proclaiming them as new chemical compounds, great American discoveries, and which were the cause of much disparagement and ridicule of American methods of synthesis.

Nearly all of these imitation synthetics have disappeared, and it is a reproach to us that any have survived—for there can be no denying that to launch a product by a misrepresentation is disreputable.

In every succeeding year new remedies, genuine synthetics, have

appeared. Among those which have survived and are in considerable demand to-day may be mentioned acetanilid, antipyrine, aristol, chloralamid, creosotal, formaldehyde, heroin, phenacetine, phenocoll, salophen, salol, sulfonal, thiocoll and urotropin.

Besides the older organic compounds: chloral, chloroform, carbolic acid, ether, ethyl nitrite, iodoform, naphthaline and salicylic acid.

Ethyl nitrite is made in several American laboratories and its consumption here approaches 40,000 pounds a year. The makers of essential oils also manufacture synthetic perfumes and flavorings, such as vanillin, coumarin, saccharine, ionone and heliotropine, oil of sassafras and oil of wintergreen.

In these processes the organic solvents are largely used—alcohol, ether, naphtha, chloroform, acetone, etc. The German maker, with cheap alcohol, has an immense advantage over the American, and if the tax were removed from alcohol used in the arts, our progress would be unimpeded.

Electrochemistry has but slightly affected pharmaceutical manufacturing. Iodoform, vanillin, carbon disulphide and hypochlorites are beginning to be manufactured with the aid of the electric current.

The making of infants' and invalids' foods is a branch by itself and digestive ferments are prepared in liquids and solids in efficient and attractive form.

Manufacturing on a large scale requires apparatus in proportion, so the beakers and glass jars are replaced by earthenware pots, enamelled iron tanks of 120 to 350 gallons capacity, block tin tanks of 500 gallons, and chemical lead tanks of 2,000 gallons. The liquids are transferred by centrifugal pumps, by steam syphons, or compressed air, and precipitates though as heavy as sand can also be pumped because these pumps are similar to the large ones used in marine dredging, of which it is reported that recently one pumped up an anchor weighing 80 pounds without injury or interruption.

The drug mills are of every kind. For fine powdering the chaser is most used, then the ball or pebble mills. Grist mills with burrstones are still much used and steel rolls; while high-speed pulverizers, rotary cutters and crushers take the leaves and roots.

While in pharmaceutical machinery the Americans are far in the lead, the German apparatus for work in organic chemistry is pre-

eminent. Think of an autoclave, lined with acid-resisting material, having a capacity of 500 litres, with stirring paddles working under a pressure of sixty atmospheres.

Ingenious machines are now very generally used in American pharmaceutical laboratories. The modern pill machines are marvellous, especially the final one, holding the pills by suction as they are dipped in the coating, which enables one girl to coat 100,000 pills in a day, etc.; and tablet machines are now in use which stamp twelve tablets at a stroke and make 500,000 in a day. One young girl attends two machines, and thus makes 1,000,000 tablets in a day.

Perhaps the two greatest aids to manufacturing pharmacy are vacuum distillation and centrifugal extraction. The former has long been in use, but the latter has only come into general use in this country during the past fifteen years.

The immense filtering racks and presses that formerly encumbered a laboratory are now usually replaced by centrifugal machines which take up but little room and save much time, while the quantity of wash liquor is so reduced that the loss by washing is unimportant. The cheapness of certain leading products is due almost entirely to these machines—aloin is an example, as it must be well but quickly washed or it is decomposed.

Fifty years ago the medical world was much interested in glycerin as a remedy for the skin, as a solvent for drugs and as a vehicle for administering them. The use of it has grown to vast proportions, and the service done by Chevreul should always be acknowledged. I had the privilege of visiting him in Paris, when he was 100 years old, and of expressing the gratitude and admiration felt in America for his discoveries. He replied with a bright smile that he had always admired Americans and regretted that he had never been able to visit us.

Glycerin, ox gall and vaccine were almost the sole animal products then on the druggist's list, but pepsin soon followed and pancreatine, while during the past ten years the laboratories have annexed the barnyards, and the serums and toxins and extracts from glands have become of great importance. These biological departments are under the direction of scientists trained in bacteriology, which demands niceties of cleanliness and carefulness of sterilization that would be a revelation to the apothecary of fifty years ago.



The makers of plasters and surgical dressings also have splendid vacuum appliances of great size for sterilization.

Extract of malt is made tons at a time in low pressure vacuum pans, while diastase is prepared in a wonderfully active state.

By-products of the huge packing houses are extract of beef, pepsin and pancreatin, and stearin; while the creameries make sugar of milk and caseine.

Returning to our laboratories, the most important galenicals they make besides the extracts are aloin, santonin, resin scammony and resin podophyllum. Then there are a variety of emulsions, elixirs, syrups, and medicinal wines.

The large pharmaceutical laboratories have been laudibly enterprising in their search for drugs and have introduced some of great value—cascara, for instance.

The demand for the chief alkaloids has steadily increased until the production of quinine and morphine has become enormous. The estimated annual consumption of quinine in the United States is five million ounces, and that of morphine is four hundred thousand ounces.

The manufacture of strychnine, caffeine, and cocaine has developed so greatly that it seems at the present time to be ahead of the consumption, large though it be.

Fifteen years ago cocaine sold by the grain and now its annual consumption in this country approximates one hundred thousand ounces.

Most of the mineral acids and salts sold by the druggists are heavy chemicals and are now made by the combination. Rochelle salt, cream of tartar, magnesia, borax and chlorate of potash have long since outgrown the pharmaceutical laboratories; but these still make the salts of bismuth and certain salts of iron and manganese and of mercury besides iodides and bromides and phosphates and peroxide of hydrogen, while latterly several have undertaken the manufacture of lithia from its minerals, lepidolite from California and spodumene from Dakota, with the result that the price has fallen in two years from \$3.30 to \$1.30 a pound; because the capacity of the plants is perhaps double the consumption, which is about sixty thousand pounds a year.

So the pharmaceutical chemist, like the alchemist of old, finds his material in rare and beautiful minerals, in the cells of outlandish

plants and in the blood of live animals, but his processes are lighted by the lamp of science, and instead of working with a few ounces he operates with quantities of thousands of pounds. The future of pharmaceutical manufactures is bright, for the standards are right, which is largely due to the men of this Association and their like.

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## STATUS AND LANDMARKS OF AMERICAN PHARMACY AND THE DEVELOPMENT OF PHARMACY DURING FIFTY YEARS.<sup>1</sup>

BY J. L. LEMBERGER, Ph.M.

Reminiscences call up things, events and persons of yesterday, the recalling of which will serve my purpose in responding to the duty assigned me as a help to the proper celebration of this fiftieth anniversary.

Our early recollection of this Association, as a young man, comes to us with feelings akin to an inspiration. I remember the impression made upon me that I was about to become associated with a great body; and when I gazed upon what was then the personnel of the American Pharmaceutical Association, I soon discovered, on coming into closer fellowship, that it was a privilege for a young man to meet and associate with the men that composed that body—men that made American pharmacy what it then was and moulded influences which have continued to develop and perpetuate the art as we find it to-day; men who with prophetic vision at their initial meeting seemed to foresee the great necessity of safeguarding the nation against the admission of drugs of only full standard purity, who in this act recognized that quality and not quantity for value was the safe method, and that integrity and skill, if rightly applied, would commend their acts and would win to their confidence and fellowship the colleges of medicine and pharmacy, and the most able druggists and chemists of the land;—these men were inspired by no selfish, but rather the higher philanthropic motives. The men of that association were they who in their day made and revised our pharmacopœias and constructed our formu-

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<sup>1</sup> Read at the Special Jubilee Session of the American Pharmaceutical Association, September 11, 1902.

laries, made and contributed to our useful dispensaries, chemistries and treatises on pharmacy, making the high professional standard, bequeathing it as a legacy for those who take their places to-day. Delightful indeed is this duty to recall the pioneer service performed by that patient industrious body who builded so wisely and made possible our partnership and succession to the inheritance manifest in this interesting assemblage.

Do we inquire who were these noble men? Glance over the pages of our own history, or gaze upon the walls of this assembly hall and see some of the worthies looking upon us in mute picture and perhaps in spirit communion.

Education marks every stage of progress in the advancement of all science, and it will not seem strange, therefore, that early in the history of this Association the wisdom of the pioneers was directed towards a higher education, proper instruction and careful moulding of the learners or the apprentices. Many young men of that day became apprentices to the drug business only by the English custom, the process of legal indenture, and the writer enjoys the memory of an apprenticeship of this character for six years and seventeen days ; and whilst the continuance of this plan is almost obsolete—it cannot be properly a part of this paper to discuss the question—the fact is introduced only to locate this landmark of the times of fifty years ago and to recall the fact that as early in our history as 1854 an address was promulgated by this Association giving expression to the importance of adopting some measure by which the then present and future apothecaries of this widely extended country may be improved in their educational standing.

Prior to and since the organization of this Association, there existed and have been established colleges of pharmacy that have largely through their delegations or representatives to the annual meetings contributed to the progress of the science, and as a significant witness, thirty-one colleges of pharmacy and twenty-three departments of pharmacy in colleges and universities have been founded as noted here consecutively and in the order of their founding, and our table of landmarks would be incomplete without emphasizing the value of their work in the line of educational pharmaceutical progress. Let it be noted also with much interest that the initial meeting of this Association, called the National

Pharmaceutical Convention, was assembled on the call of the three colleges of pharmacy, New York, Philadelphia and Boston; and at the meeting when the name was established and adopted, the American Pharmaceutical Association, five colleges of pharmacy and one pharmaceutical society are recorded as being represented, viz:—Massachusetts College of Pharmacy, College of Pharmacy of the City of New York, Richmond Pharmaceutical Association, Cincinnati College of Pharmacy, Maryland College of Pharmacy, Philadelphia College of Pharmacy.

There have sprung from these educational centres those influences that demanded higher qualification to safeguard the public welfare, and in course Boards of Pharmacy have been established in many of the States of this continent and laws have been enacted to regulate the practice of pharmacy. State Pharmaceutical Associations have gathered inspiration from this mother Association of ours, whose laws are patterned after our constitution, and the greatest success of the State Association is with those who adhere closely to the custom and program of annual work as defined by this Association, and it is noteworthy that many of the annual reports are valuable additions to pharmaceutic literature.

We may here recall the names of some of the illustrious men who made a record well deserving a place in this paper: Charles T. Carney, Samuel L. Colcord, George F. H. Markoe, Charles A. Tufts, E. R. Squibb, P. W. Bedford, William Procter, Jr., Edward Parrish, John M. Maisch, Israel J. Grahame, Elias Durand, an honorary member; Alfred B. Taylor, Charles Bullock, Joseph Laidley, E. S. Wayne, W. Silver Thompson, Ferris Bringham, Charles A. Heinitsh, Charles Rice, W. Scott Thompson. Joseph Laidley and Ferris Bringham lost their lives by accident in pursuit of their profession; the former through gunpowder explosion, the latter whilst manufacturing oxygen gas.

The roll is a long and honorable one; we cannot name them all, as this is not to be a memoriam roster, but will serve to fix the characters who each in their sphere are more or less identified with the progress of the science. Most of those named have contributed largely to our work by word and pen, and here let it be recorded we are passing in review the acts of men who have rounded their lives; the work of the living we dare not embody in this paper, the worthy men of to-day are legion, but they, not having finished their

course, will be better subjects for the next jubilee papers, should they continue to do well.

I recall with great satisfaction a meeting in Baltimore when the subject of "Rhubarb" was considered, and Dr. E. R. Squibb, with his natural painstaking care, enlightened the Association with most instructive information, and during the discussion about all that could be said on the subject was there given.

Mr. Charles T. Carney's report on Home Adulteration, who with a committee of five others, one alone of the six surviving (our honored pioneer friend, Alfred Phineas Sharp, of Baltimore), will ever recall the beginning of conscientious effort to make unpopular substitution, sophistication and adulteration of drugs, medicines and culinary articles.

Almost contemporary with the organization of this Association the process of displacement or percolation was advanced. It was not originated by pharmacists so far as we are advised. We are informed in Holy Writ of the probability of utilizing wood ashes in leaching the alkali, as they also used soap in that period. The process is an old one and the application of the art has had various stages of elegance. Edward Parrish notes the French coffee-pot principle applied by the eminent firm of French Pharmaciens, H. Boullay & Sons. Their work was fully corroborated, elaborated and practically applied, as given in a paper, an original communication on Boullay's filter and system of displacement with observations drawn from experience, wherein proper recognition is given to the principle of the Cafetière de Dubelloy (the French coffee pot), Real's filter press, the long adapter of Mr. Robiquet, experiments of Mr. Guillermond, the work of Elias Durand, Mr. Emile Mouchon, an apothecary of Lyons, France, and Mr. Hany, Jr. We cannot give credit to these men as inventors of the art; at no time since the advent of the wood ash lye percolating tub or hopper has there been so much care bestowed in its application as has been since the work of Procter, Parrish, Duhamel, Israel J. Grahame, followed by Dr. E. R. Squibb, who became a specialist and eminently qualified as a collaborator with those named in developing still further the process of repercolation, which we presume will ever remain a memorial of his skill and genius.

We make this comparison: Do you remember—some do, we know—when the proper way to make the old-time tinctures was to

bruise the ingredients, place them into the shop bottle, agitate vigorously for a while the first few days, and then an especial duty was enjoined upon some one every Monday morning, so long as anything remained in the bottle, to shake the bottles from one end of the shelf to the other, decanting as wanted until the dregs were reached, and if the bottle capacity would allow, fresh portions were put with the old. We must emphasize, percolation marks a great advance. Just forty years ago we merged from the old to the new on a line of preparations which fixes a point in pharmaceutical history, noting a very decided advance on the manufacture of suppositories; the soap suppository had served its day and mixtures of wax and solid fats had also to be discarded to keep in line with the improvement; to the late Alfred B. Taylor, a retail pharmacist, an active member and first secretary of this Association, we owe the use of butter of cacao as a suppository base, and all the pharmaceutic world has learned to value this important subject. We doubt whether there is any preparation of the *Pharmacopœia* in which the revolution has been so complete. Other vehicles are used in some form of suppositories—gelatine, sodium stearate, which also mark advances in the time under review, but no one person has performed such a specific service as did Mr. Taylor in promulgating cacao butter as a suppository base. Let me quote a paragraph from the *U. S. Dispensary*, 1854:

"Their form may be cylindrical, conical or spherical. They should be of such a consistence as to retain their shape, but so soft as to incur no risk of wounding the rectum. It may be from 1 inch to 3 inches long and about as thick as a common candle. Soap is not unfrequently employed for this purpose—a piece of solidified molasses (molasses candy) is sometimes preferred." Reference is then made to *AMERICAN JOURNAL OF PHARMACY*, Vol. 24, p. 211, the work of Alfred B. Taylor.

Fluid extracts must hold a place specifically American, and the preparation and popular use of this class marks the work of our period, and whilst we can make no special claim to a discovery, we place on record the fact that we owe much, if not all, for the excellence in this line to two most earnest retail pharmacists, the distinguished and honored William Procter, Jr., and Israel J. Grahame; the latter during his best days and before physical infirmity assailed him, was a good type of an intelligent, honest and industrious phar-

macist. Dr. E. R. Squibb's masterful work on a larger scale was made possible by their prior labor and research.

We all remember with what diligence Prof. John M. Maisch made preparations for our annual meetings—for many years our permanent secretary—and yet with all other labor, our proceedings show that his contributions to the advance of pharmacy are most valuable as well as voluminous.

Of another great promoter of the art, who in his day contributed largely in developing pharmacy—Prof. Edward Parrish, a physician just rounding his fiftieth year of active practice—Dr. William M. Guilford, of Pennsylvania, writes: "Edward Parrish lectured to medical students, whilst we were students in the old University of Pennsylvania, at hours which did not interfere with our regular hours at the college; he not only lectured but put us to the practical work, writing and compounding prescriptions in his own laboratory, Eighth and Arch Streets. He was much beloved by his incipient M.D.'s, who will never forget his kindly face, his patience and earnestness. The practical value of his teaching was best appreciated by many physicians in after-years while in active practice." It will be remembered that Professor Parrish succeeded Professor Procter in his work of instructing students of pharmacy on a larger scale at a later date.

We note a very conspicuous advance, and well deserving a place in this paper, as we compare drug store and laboratory glassware. Go to our exhibition hall, note the former-day shop bottles, ointment containers, prescription vials and bottles; compare with the neatly finished glassware of to-day, put them side by side with the ware of that day, run the eye along the line from the minute gramme vial to the huge glass container with capacity of thirty and more gallons, and note also, with special critical eye, the absolutely perfect finish in every detail. This is in a large measure due to the encouragement of this Association. I may simply recall an incident at one of our meetings held in Louisville, Ky., when a representative of one of our leading glassware manufacturers took special pains to obtain such points by interviewing our members that would enable his firm to perfect the lip of the prescription-bottle. The growing want of the laboratory and dispensing store for glassware during our history safely defines conditions then and now.

Elegance and excellence in pharmacy, as compared with former

days, are significant landmarks. We refer especially to pills, round in form or compressed, elixirs and plasters. The pharmacist cannot lay claim to invention in the matter of sugar-coating pills; it, like percolation, has been borrowed to apply in the advances and development of the art. We have always been clever enough to know a good thing when we see it and how to apply the improvement if it serves our purpose so to do.

As a representative of the retail branch of the profession, and with great deference to the skill and labor of wholesale manufacturers, I cannot pass unnoticed the fact that most of these advances have developed behind the counter and in the laboratory of the retail pharmacist.

They were worthy men who had a part in this development, whose portraiture has been presented to you in retrospect, and who have established landmarks. Dare we say that they have lived in vain? We may say only they have gone before and they still live in their deeds, and though dead their labor bears testimony to-day. Some of us are a generation younger, and by far the larger membership to-day comparatively younger by several decades. We may view this honor roll and find in the men and their characters an example worthy of emulation. It is well believed that in the providence of God the evangelization of the millions in heathendom must be accomplished by personal contact through education as the current of a new life—so may we well and properly conclude that the development of our profession for the past fifty years has been accomplished largely by the personal influence, the unflagging integrity and career of usefulness of the men that constitute this tribute defining the status and landmarks of American pharmacy.

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## OUR CENTENNIAL.<sup>1</sup>

BY JOHN URI LLOYD.

Strange, is it not, that standing as to-day we do, in the fulfilment of this semi-centennial of our Society, one among us should look forward and venture to refer to "our Centennial," as though the years that separate us from a future period, doubling as they must

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<sup>1</sup> Read at the Special Jubilee Session of the American Pharmaceutical Association, September 11, 1902.



the age of our Society, were here? And even more strange is it that one who feels assured that neither matured friend nor himself will then stand here, should thus preface his remarks and thus title his subject? Few among the very youngest men present can hope to meet with those who fifty years from now will celebrate this centennial anniversary. Audacious, then, in view of these facts, is it not to head this paper "our centennial," this paper which bespeaks an event destined to occur more than a generation hence?

Let us, however, ask whose by right is the semi-centennial jubilee we hold this day? Let us see who it is that stands conspicuous in all that takes our thought and action on the present occasion. Surely not you and I, my friends, even though we may have been in rank these many years, even though a few can look back to the very beginning. You who listen to these words, you whose faces, be they young or old, turn upon me as I speak, meet not here to celebrate your own good selves. Even the concern of the pioneer is not in laudation of his own works—he celebrates not himself. Nor do we meet to glorify those whose names on our printed program are designated as taking part in these exercises. Nor to those whose turn it is either to precede or follow me this day in a word of tribute or a kindly offering in behalf of this Society's semi-centennial. Nor yet to those of our members whose business cares or physical misfortunes prevent their personal presence on this happy occasion. This is not a self-admiration society. The men who move before us and speak aloud this day do not, on their own account, bring us together on this our markedly eventful mission.

No. The unseen touch that comes to each heart, as memory tells of the past and of men no longer with us, beats the throb *no*. The silent voice that no longer vibrating air or touching ear, yet clear and distinct both in accent and modulation, lingers in recollection to him who knew it once, bids us speak the word *no*. The printed line that tells of action done by an ever-to-be absent comrade lies in a volume on our shelves, but the words are not a slumbering nothing. To us who heard their creator speak, they yet linger in realms realistic and bid us give credit to absent friends who earned their part in this semi-centennial of our Society. Behold, where sits the present secretary, rises to our mind's view another face. Where stands our president, a chain of absent faces uplift themselves. Our treasurer has genial company in our thought.

Where sit those ex-presidents and officers, we, who look upon them, see other forms. Where journalists, authors, scientists, educators, men of learning and men of action gather before us, others wedge in, invisible to all but such as knew these other men in these places. Messages of kindly greeting offered in days gone by awaken as their faces spring before us and touch our hearts. Conjured into shape and form are these greetings by memory's charm, but real as life are they to him who feels the touch. Gone are rivalries, the antagonisms, the differences and varying ambitions of all these men. Lost are they to sight and touch under the soporific influence of the hand that winds the years away.

Let us not mistake, my friends, the dominating feature of this semi-centennial of our Society is the tribute of praise we offer our absent comrades. A monument of love it is to their good works, and our joy is largely in this opportunity to voice our pride in their gift to humanity, our inheritance.

Bid now a momentary farewell to the phalanx memory creates. Turn thought onward. A second fifty years begin. The future looms before us. The spindle of time turns, the years reel off. One by one the faces of the men present this day turn to dust and disappear in vacancy. The babe unborn creeps, rises and stands upright, strong in life's pride. The child of to-day becomes of age mature. The Society lives on. Then comes at last another knot in the line Time spins. A second day of jubilee is here. Another fifty years have passed.

Unheard are the voices of those who this year, 1902, made the call for this semi-centennial. The printed envelope bearing the invitation of this second jubilee celebration is dated 1952. It comes not to our homes. The program of the day bears not our names. Men we have never seen have taken our place in thought and work. Gone are we into the silences. Other feet seek this spot where their forefathers one hundred years before met to organize the society that through our hands came into their keeping. Their eyes turn backward, as ours do now, and we are seen as we now behold those who met in this place fifty years ago. To the mind of him who then thinks, and of him who then reflects, will come a cherished touch, like that which comes to you now, my friends. The same, it must be the same, and yet not altogether the same. As we look back and note the stopping place of this or that friend,

whose work we now celebrate in this semi-centennial, so must they look back, but not upon the same memory creations. The program of that eventful occasion will be marked *Centennial*, not *Semi-Centennial*, and those who celebrate the occasion will meet, not to glorify themselves, but to honor all whom we meet to honor and, I bid fair to hope, ourselves as well. It will be their jubilee session in honor of *Our Centennial*, the centennial that marks the uplifting of heart-monuments to absent comrades.

Let us, then, in this jubilee greeting we offer to our past comrades, hope and trust that when the next fifty years have been unwrapped and the second call is made, the part we have taken in behalf of this Society may bespeak for us in kindly touch the backward thought of those who join therein.

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### AN ODE<sup>1</sup>

TO THE FOUNDERS OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

BY GEORGE M. BERINGER, A.M., Ph.G.

Thrice welcome day, all hail to thee,  
We salute thee, pharmacy's jubilee.  
The sands of time are flowing fast,  
The fiftieth mile will soon be past.  
Yet, ere we take the final forward stride  
That "this" into history of "the was" doth glide,  
In meditative mood we pause  
And backward gaze and muse  
From the spring that perpetual flows  
The source unknown, no eye discloses;  
It's memory's own, she controls, she draws  
Such copious recollection showers  
And dashes the remembrances o'er us.

Our retrospect, a vision clear,  
Five great stone arches do appear;  
Each span a decade marketh here  
The last just completed with this year.  
Now half way o'er a century's stream  
A noble work accomplished it doth seem.  
In the distance, still bright to view,  
The first boulder stone laid firm and true;  
Carved its face indelible, "eighteen fifty-two,"  
Our model ever, we finish nineteen two.  
For hopes spring amid ambition's glow,  
Just as they did fifty years ago.

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<sup>1</sup> Read at the Semi-Centennial Jubilee Session, September 11, 1902.

No worship of the heroes of war and strife  
Is nobler than praise of deeds of peaceful life.  
Pioneers these, who achieved in science and in art ;  
Progress their watchword, faithful toil their part.  
Their labors so perfect, their works so pure,  
Bright examples gleam as from God's azure.  
In the gladness of our golden jubilee  
We extend the praises of all pharmacy  
To the art and sciences, the early devotee.  
Recalled by memory's fantastic flight,  
We see their forms ; their faces bright,  
E'en their voices from these walls resound,  
Though now, with our tributes they abound.

Each year, earnest pilgrims to their shrine  
Add new efforts and extend the line,  
With added strength, the later arches wider  
Each, the progress of its age, the bold recorder.  
The ever-living words of the immortal Procter  
Cements the masonry—needs no other mortar.  
“ On virtue we must in our actions stand,  
Or our association might as well disband.”

The sun, slowly rising, dispels the gloom  
And early morn proclaims to man and bloom.  
Then, higher rising, bursts forth in full power,  
The perfect day demands the perfect flower.  
The past, the present, now are ours  
To shape and mould for future powers.  
Duty calls for builders to the line ;  
Pharmacy, unexhausted field and mine,  
Demands new energies in the fight  
And strenuous labors for the right.  
To the future, the present must our heritage  
Transmit with greatly added store and page.

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## THE PREPARATION OF OLEATES, OLEO PALMITATES AND OLEO STEARATES IN POWDER FORM.

BY FREDERIC E. NIECE.

(*Concluded from the September issue.*)

Warm the stearic acid in a glass vessel to just its melting point; to this add the oleic acid previously warmed to just its boiling point and mix the two acids intimately with a glass rod. Now add the alcohol, which has been warmed to just its boiling-point, and mix all

three together thoroughly by constant stirring until cool. After cooling, if any hard lumps are noticeable in the mixture, they should be removed by heating, then straining through a piece of wide meshed cloth, then cooled again by constant stirring. Now heat solutions No. I and No. II to just their boiling-points and quickly as possible pour the two solutions simultaneously into a gallon glass or porcelain vessel. Stir the resultant mixture vigorously until it becomes cool. The result is a thick, soapy, alcoholic solution of oleo-stearate of potash. Gently reheat the above solution to a lukewarm state and to it add 2 pints of boiling distilled water and again mix completely by vigorous agitation. After a complete mixture is obtained, quickly as possible pour into it the prepared solution of zinc acetate which has been warmed to just its boiling-point and thoroughly stir this combined solution to a uniform mixture until cool, which then has a creamy consistency. When cool, add two more pints of boiling distilled water and stir this mixture until this is also cool.

The solution, as prepared above, then contains the oleo-stearate of zinc and by-products, which latter are to be disregarded.

To separate them, pour the solution on a piece of moistened draining-cloth (common toweling is best), with close meshes, suspended over a vessel to catch the washwater. Collect the precipitate on the cloth and return the washwater to the drainer from time to time until it shows but a slight turbidity. Wash the precipitate on the drainer repeatedly with quantities of warm water until the washwater is free of all traces of the acetate of potash and is neutral to litmus paper. After neutrality is accomplished, the cloth and its contents are suspended in a moderately warm place, well protected from contamination and allowed to thoroughly dry. When well dried the mass is then triturated to a fine impalpable powder. The powder, if carefully prepared, has a nice, fluffy, white appearance; smooth, soft and greasy to the touch, and possesses a pleasant, bland, fatty odor, somewhat aromatic, and neutral in reaction.

In the preparation of the oleo-palmitates the only deviation necessary in the process is the use of 450 grains of palmitic acid instead of the stearic acid, and the process then followed out as stipulated, with results corresponding to substances used.

In working with larger quantities than here specified, the alcohol in the washwater may be reclaimed by adding sufficient potassium

permanganate to the water to give it a permanent pink color, and the process of distillation resorted to for its removal. The combinations which may be formed by the addition of other substances are as numerous as they are varied. A partial list is here given, which may be used with one another in varying proportions. Those most generally used are: Acetanilid, acid boric, acid carbolic, acid pyrogallic, acid gallic, acid tannic, acid salicylic, alum, balsam peru, bismuth subgallate, bismuth subnitrate, calomel, camphor, chrysarobin, creosote, guaiacol, ichthyol, iodoform, menthol, naphthol, oil cake, resorcin, salol, sulphur sublimed, tar, thymol and zinc oxide. A pleasant oleaginous preparation can be produced with the powdered oleo-stearates or oleo-palmitates, in combination with any of the above-mentioned substances, by incorporating the same with a quantity of pure, bland, odorless and colorless liquid petroleum.

The following formula gives an idea of the method involved:

MISTURA OLEO-PALMITATE ZINCI WITH ACIDS BORICI AND CARBOLICI.

Powdered oleo-palmitate of zinc	5 ij
Acid boric	ʒj
Solution acid carbolic	℥v
Liquid petroleum alba, q. s.	3 ij

Triturate the oleo-palmitate of zinc and boric acid with the petroleum; to this add the solution of carbolic acid, and agitate to a homogeneous mixture. Always agitate before using.

## RECENT LITERATURE RELATING TO PHARMACY.

### CANNABIS INDICA.

E. M. Holmes, F.L.S. (*Phar. Jour.*, Aug. 16, 1902) gives some extracts from a "Report on the Cultivation and Use of Gánjá," by Dr. D. Prain. The names that are applied to the different preparations or different forms of this drug as it occurs in India, are of interest.

*Gánjá*.—This is the most important preparation of the plant, from the point of view of medicine or pharmacy. It consists of the flowering tops of the female plants, deprived as much as possible of leaves.

*Gauza*.—This is applied to gánjá which comes from Bombay; it is usually considered inferior in quality to that from Calcutta.

*Bhang*.—This consists of the selected leaves of the plant, dried and broken up into coarse powder. The leaves of the male plants or of the non-resinous female plants are not taken.

*Haschisch*.—This word literally means "the plant," and is used in Syria, Turkey and Egypt to indicate bhang, churrus and even alcoholic preparations of the plant.

*Majun* is applied to a sweetmeat or confection, of which cannabis indica is the basis. It may, and often does, contain other drugs, according to the purpose for which it is intended.

*Chur*.—This is applied to the broken or detached heads of gánjá.

*Charas*, or *Churrus*, is the resin obtained from the flowering tops and is collected in different ways, in different districts.

It is perhaps interesting to note that churrus is not made in Central India. In Punjaub and Nepal it is collected by hand from unreaped plants. In Ladak, Yarkand and Turkestan it is collected by beating reaped plants upon coarse cotton cloths, to which the resin adheres. Churrus is also said to be made in Greece, but whether on the mainland or on the islands of the Greek Archipelago is not known.

The classical account implies that it is produced in Central India, but inquiries made by Dr. Prain show that this is not so. The curious story that is usually told in this connection, of its being obtained by natives rushing through the hemp fields, and the resin being subsequently scraped from their leather jerkins or naked (oiled) bodies, is difficult to trace to its origin. Extensive inquiries by Dr. Prain failed to produce any evidence that it was, or ever had been, collected in this way.

From a study of the resin, and the manner of its occurrence on the plant, Dr. Prain concludes that it is not likely that naked men with oiled skins could collect much churrus in that way.

M. I. W.

## AMERICAN PHARMACEUTICAL ASSOCIATION.

The fiftieth annual meeting of the American Pharmaceutical Association was held in Philadelphia, September 8-15th, the Hotel Walton being the headquarters of the Association. The audience that assembled at the first general meeting on Monday afternoon, September 8th, was notable in numbers and as representing the allied interests of pharmacy throughout the land, and testified to the universal interest in this the jubilee meeting of the Association. The President, Dr. H. M. Whelpley, introduced the Hon. Samuel H. Ashbridge, Mayor of the city, who welcomed the Association in a brief address. M. N. Kline welcomed the Association in behalf of the local committee of arrangements and said that he was glad to see so many present, and that it was eminently appropriate for the fiftieth anniversary to be celebrated in Philadelphia, as the first president of the Association was born here, and here was established the first school of pharmacy. Here Wood and Basche taught and here Procter and Parrish lived and worked. Warren H. Poley, president of the Philadelphia Association of Retail Druggists, welcomed the members on behalf of that organization, stating that it has a membership of 550 out of a total of 700 druggists.

In response to the addresses of welcome, Wm. C. Alpers, of New York, spoke on behalf of the members of the East; E. G. Eberle, of Texas, for the Southwest and Wm. E. Frost, of St. Paul, for the Northwest.

President Whelpley stated that he recognized his responsibilities and invited all the living ex-presidents present to come upon the platform with him. The First Vice-President, Wm. M. Searby, took the chair while the president delivered the annual address. The latter was devoted to a review of the important work done by the Association for the elevation of American pharmacy, and also to the consideration of means whereby the Association might be benefited. The address contained some twenty-one definite suggestions, of which we mention the following:

"Article IV of Chapter IX of the by-laws requires every person presenting a paper which will require more than ten minutes to read, to accompany the paper with a synopsis which will not require more than ten minutes for presentation. Every person presenting a paper should also be required to furnish an abstract for publica-



tion in a program to be issued under the direction of the officers of the section to which the paper is referred. Authors of papers should be furnished a specified number of reprints, free of charge."

It was suggested that a standing committee on "A Model Pharmacy Law" be established, this committee to co-operate each year with the presidents and committees on legislation of the various State associations in furthering the general adoption of the model law. Annual reports should be made to the A.Ph.A., giving the progress of the work and submitting such changes in the original draft as may be deemed advisable.

"This Association should encourage, in every possible way, an improvement of the quality of apprentices and the conditions of apprenticeship. In providing the pharmacists of the future, we must select proper seed, plant it in fertile soil, and not harvest the crop until the fruit is ripe."

The president also recommended the publication in a separate volume of a general index to Volumes I to L of the annual Proceedings.

The address was referred to a committee of three, consisting of S. A. D. Sheppard, A. E. Ebert and J. N. Hurty, who later favorably reported on the suggestions contained therein.

At the second general session on Tuesday morning, the Nominating Committee presented its report, the nominees recommended being elected to the respective offices as follows: President, George F. Payne, Atlanta, Ga.; First Vice-President, William L. Cliffe, Philadelphia, Pa.; Second Vice-President, E. G. Eberle, Dallas, Tex.; Third Vice-President, H. P. Willis, Quebec; Secretary, Charles Caspari, Jr., Baltimore, Md.; Treasurer, Samuel A. D. Sheppard, Boston, Mass.; reporter on the progress of pharmacy, C. Lewis Diehl, Louisville, Ky.; members of the council: John F. Patton, York, Pa.; H. M. Whelpley, St. Louis, Mo.; C. S. N. Hallberg, Chicago, Ill.

Geo. W. Kennedy, the secretary, read the minutes of the council since the last meeting, and on moving their adoption, C. A. Mayo recommended that the resolutions passed by the council in memory of Wm. S. Thompson, who had been chairman of the council for some years and who had served the Association faithfully for years, be adopted by the Association at large, which was carried by a rising vote. The recommendation of the council to the effect that a historical section be inaugurated was discussed, and finally it was

decided that a historical committee be appointed to report annually to the Association.

Owing to the difficulty of awarding general prizes, the chairman of the committee, Wm. Mittelbach, Missouri, recommended that hereafter, the papers submitted be classified in accordance with the department of pharmaceutical science or art of which they treated, and that one prize be awarded in each department.

The Committee on National Legislation, through its chairman, Frank C. Henry, reported that very little legislation had been accomplished at the past session of Congress that affected pharmacy. Joseph Helfman, Detroit, called attention to the important law which had been enacted at the close of the last congress which prohibited the sale of antitoxin at a date later than that borne by the package sold.

The report of the Committee on Semi-Centennial was presented by the chairman, George M. Beringer, which was adopted with a vote of thanks for the commendable work of the committee. Lewis C. Hopp, Cleveland, chairman of the Committee on membership, presented a report containing several recommendations. This was followed by the report of J. W. T. Knox, Detroit, chairman of the Auxiliary Committee on Membership, in which it was recommended that the Association publish an official monthly journal to take the place of the annual volume of Proceedings as now issued. A committee of five was appointed to consider the recommendation. This was further discussed at a special session held in the evening and at several meetings of the council, but it was decided to lay the matter over until next year.

The third general session on Wednesday morning was devoted to short talks by those having exhibits at the meeting or by their representatives. The historical exhibit arranged by the committee having in charge the Jubilee Session proved of great interest, as the committee had collected valuable manuscripts, rare books, apparatus and specimens of historical interest, as well as the fixtures and shop-ware of an old-time drug store. Prof. J. U. Lloyd read a paper on "Prehistoric Pharmacy," which will be published in a later issue of this JOURNAL. The special features of these exhibits will be described in a separate paper.

At the last general session held on Monday afternoon, September 15th, the Secretary of the Committee on Membership reported that

about 250 applicants had completed their requirements for membership in the Association and had been duly elected at this meeting. Dr. Frank B. Woodbury, delegate from the American Medical Association, expressed his appreciation of the work accomplished by the delegates of the A.Ph.A. to the Section on Materia Medica and Therapeutics of the American Medical Association. The Committee on Time and Place of meeting reported that Mackinac Island, Mich., had been selected as the place for the next meeting, the time set for the meeting, August 10, 1903. The Committee on Exhibits, Chairman, Thos. P. Cook, of New York, reported a balance of \$950.16, and this was accepted with a hearty vote of thanks. The Committee on Weights and Measures reported through the Chairman, Frank G. Ryan, Detroit, that satisfactory progress had been made and that the measures before Congress would be probably adopted at the next session. Mr. Kline moved that the Association place itself on record as favoring reduction on the tax on alcohol, which was carried. Mr. Searby stated that under the present ruling crude drugs which are subject to fermentation on account of the necessary treatment to prepare them for the market are classified with the fermented liquors and are subject to duty, whereas crude drugs are admitted free, and offered a resolution to place them on the free list, which motion was carried. Mr. Mayo then moved that the President appoint a committee of twenty-five to confer with the Trustees of the Carnegie Institution in regard to formulating measures providing for pharmaceutical research under the auspices of that Institution, which motion carried. The Secretary then read a number of telegrams and letters of congratulation from individuals and societies in this country, and abroad as well. The council had recommended making extracts from these letters and printing them in the proceedings and it was so ordered. C. S. N. Hallberg, chairman of the delegation to the American Medical Association, reported on the work accomplished by the section on materia medica and therapeutics at the last meeting and said that two papers presented by the delegation were given special consideration, viz.: on "Hypnotics and Analgesics," by Dr. Jelliffe, New York City, and on "Metric Weights and Measures," by himself. George F. Payne, chairman of the Committee on the Status of Pharmacists in the U. S. Employ, reported that the title of pharmacist had been given to the Hospital Stewards of the Marine Hospital Service, and that Dr. Rixey,

the Surgeon-General of the Navy, favored making pharmacists in the employ of the Navy commissioned officers. Mr. Wilbert then presented a recommendation to the effect that the metric system be used whenever practicable in connection with the work of the Association, which was carried. He also moved that in order to facilitate the work in the various sections, all authors be required to prepare written abstracts of their papers for presentation, which was also favorably acted upon. The by-laws were amended so as to give each of the sections two sessions each at each meeting of the Association. The recommendation passed by the Scientific Section approving the establishment of a drug laboratory by the Government was also adopted by the Association. Resolutions were passed endorsing the action of the Scientific Section relative to "standardizing dose measures" which had been recently adopted at a pharmaceutical meeting of the Philadelphia College of Pharmacy (see p. 243 in the May issue of this JOURNAL). The report of the Committee on Procter Memorial was read by the chairman, Joseph P. Remington, in which it was recommended that the life-membership fund be known hereafter as the Procter Fund, and that a special committee of five be elected by the council to award a Procter-Squibb medal for high scientific attainment. It was also recommended that a button-badge having a bas-relief of Professor Procter be made for those in attendance at the annual meetings. After some discussion the report was accepted.

#### SCIENTIFIC SECTION.

The time of the Scientific Section was limited to two sessions, but nevertheless a large number of papers were presented. Lyman F. Kebler, the chairman, presented the annual address, which was devoted to a review of some of the recent advances in chemistry and to a discussion of some pharmacopœial problems. The speaker referred particularly to the necessity of the adoption of uniform methods in the assay of drugs, and recommended that the Subcommittee on Proximate Assay of the Pharmacopœial Revision Committee report the results of their work annually to the Scientific Section of the A. Ph. A.

The address was referred to a committee which, later, through Virgil Coblentz, the chairman, reported as follows: "It is recommended that the Pharmacopœia Committee authorize the continu-

ance of the work of the Sub-committee on Proximate Assays, which should extend over the entire period of ten years following the last revision, and that the results be reported from year to year to the Scientific Section of this Association. During past revisions the Pharmacopœia Committee has, as far as the funds available permitted, carried on investigations in various fields, and while we recognize the value and desirability of more work being concentrated on the subject of proximate assays, yet this recommendation will largely depend upon the size of the fund which may accumulate after the issue of the coming revision. We suppose that the chairman of the Committee of Revision will have no objections to the presentation of the results of future investigations to the Scientific Section. The criticism relative to the extreme rigidity of present Pharmacopœia standards is a point well taken and fully recognized by the Committee of Revision, and such errors of stringency will certainly be corrected."

Various reports were read at the first session, the first being an elaborate report by the Committee on Drug Market, which was presented through the Chairman, E. L. Patch. The report was accompanied by resolutions relative to the promise of support by the Association in the establishment of the new drug laboratory in connection with the work of the Bureau of Chemistry of the U. S. Department of Agriculture. These resolutions were favorably acted upon by the Section and subsequently by the Association. Dr. H. W. Wiley, who was present, spoke of the objects of the new drug laboratory and said that it would be to unify by association the work of pharmaceutical chemists, just as that of agricultural chemists had been unified so that the work of different chemists in different places would be comparable.

The Ebert Prize, it was announced, was awarded this year to J. O. Schlotterbeck and H. O. Watkins for their paper on "The Alkaloids of *Adlumia Cirrhosa*." At the second session the following officers were elected: Chairman, J. O. Schlotterbeck, Ann Arbor; Secretary, Joseph W. England, Philadelphia; Associate, Francis Hemm, St. Louis. A. B. Lyons, Chairman of the Research Committee of the Scientific Section, reported the work that was being done by the various members, most of which is embodied in several papers presented to the Section. The report of the Special Committee on the Revision of the U.S.P. was presented by the Chairman,

R. G. Eccles, and contained a number of suggestions tending to improve some of the official preparations. It referred to the awkward position the Committee found itself in by being asked to make a report too late for use in the 1900 revision and too early for that of 1910. Such suggestions as might be made may have already been adopted. The plan was chosen of advising changes, certain not to be made now but that exist as possibilities for the future, and adding to these a few points which it was thought may have been overlooked by the present revisers. Physiological and volumetric or gravimetric standards for alkaloidal and glucosidal drugs had been rejected. The Committee thought that these should, at some time not too remote, be accepted, as by fixing such standards the quality of the goods will be kept up, even if pharmacists are not able to apply the tests. Commercial competition will do it. Since most of the plasters sold by druggists have a rubber base, the presence of this rubber in plasters should be acknowledged in order to lessen the danger of conflict between pharmacists and drug-adulteration laws. Solid extracts made with acetic acid as well as those made with alcohol should be acknowledged. For external use, in plasters and the like, methyl alcohol extracts should be permitted. Powdered extracts should be more extensively adopted or directions should be supplied for the preservation of the proper consistence of all official extracts. Extract of belladonna-leaf stains, has a bad odor and is of very variable strength. Extract of the root should take its place. Belladonna plaster should be standardized and the British and American standards should conform to each other. Belladonna liniment should be replaced by a solution of camphor and atropine. A belladonna and capsicum plaster should be made official. Compound licorice powder should get rid of its excess of insoluble lignin by substituting powdered extract of licorice for powdered licorice root. Commercial licorice should have a test that would exclude water-soluble adulterants like sugar and dextrin. As there are natural wines with an alcoholic strength of 15.5 per cent. by weight, our present standard should be raised to this figure. Wine of ipecac should be replaced by a solution of emetine hydrochloride. In making aromatic spirit of ammonia twice the quantity of alcohol now ordered should be used. This would make a 10 per cent. solution, which could be lowered to the desired standard by dilution. The ignition of the organic alkalies should be complete

and all the organic matter destroyed before using the acidimetric test in salts like benzoate and salicylate of sodium. In the test for creosote, 1.75 grammes, instead of 1.3 grammes, of sodium hydrate to every 4 c.c. of creosote should be used. In solution of hydrogen dioxide the text should tell how much, if any, acid and the kind of acid that should be permitted for preserving it.

The following papers were presented, which are herewith given in abstract :

CONCERNING SCOPOLAMIN AND SCOPOLIN.

By Ernst Schmidt, Marburg, Germany.

An abstract of this paper was presented by Henry Kraemer, Philadelphia. The paper dealt particularly with preliminary experiments which had for their object the establishment of the constitution of scopolin. On the treatment of the latter with hydrobromic acid it is changed into a dihydroxyl derivative, which action he explained by supposing that one of the oxygen atoms is arranged in a morpholine-like combination. The author stated that one of three possible constitutional formulas may be ascribed to scopolin, and subsequent work should reveal the true constitution.

ON GUAIAIC-BLUE AND ALOIN-RED AND THEIR USE FOR CHEMICAL REACTIONS.

By Ed. Schaer, Strassburg, Germany.

Charles Caspari, Jr., read an abstract of this paper, in which the author points out the sensitiveness of guaiac-blue and aloin-red reactions, the analogy between them, and indicated the instances when they may be of particular value in chemical analysis: (1) In the detection of aloes, *i.e.*, aloin; (2) in the detection of the presence of different cyanic compounds and of haloid salts; (3) in the detection of free ammonia in air or in distillates; (4) for the detection of copper in the form of cupric salts; (5) for the detection of active organic substances able to carry oxygen.

THE CHEMISTRY OF THE STEM OF DERRIS ULIGINOSA BENTH.  
(AN EASTERN FISH POISON.)

By Frederick B. Power.

An abstract of this and the following paper was presented by Charles Caspari, Jr.

The following is a summary of the essential results of the experimental work of the author; the alkaloid which it is said occurs in the bark could not be obtained. The bark contains 9.3 per cent. of tannin, which is colored greenish with ferric chloride. It also contains capric acid, arachidic acid, stearic acid, ceryl alcohol and two isomers of cholesterol; there are present two resins, the one being soluble in chloroform and the other insoluble in chloroform, a portion of which consisted of a glucoside; the tonic action of derris on fish appears to be due to some constituent of that portion of the resin which is soluble in chloroform and not to the tannin.

THE ANATOMY OF THE STEM OF DERRIS ULIGINOSA BENTH.  
(AN EASTERN FISH POISON.)

By P. E. F. Perrède.

*Derris uliginosa* is very abundant in Wakaya, where it is known as "Duva," but on the other islands of the Fiji Group it is somewhat scarce on account of having been largely used by the natives as a fish poison. The author described in detail the anatomy of the stem, which was accompanied with numerous well-executed drawings.

THE QUANTITATIVE ESTIMATION OF STRYCHNINE IN MIXTURES OF  
STRYCHNINE AND BRUCINE.

By H. M. Gordin.

The author has worked out the following method for the separation of strychnine and brucine:

The mixed alkaloids, for example, the residue of total alkaloids obtained in the assay of nux vomica from 8 or 10 grammes of drug, is dissolved in 15 c.c. 3 per cent. sulphuric acid by the aid of water-bath heat, the solution is cooled to ordinary temperature and 3 c.c. of a previously prepared and cooled mixture of equal parts of strong nitric acid (sp. gr. 1.42) and water added to the alkaloidal solution. The liquid is set aside for exactly ten minutes, shaking it gently three or four times during this time. The red liquid is now transferred to a separator containing 20 or 25 c.c. of 10 per cent. sodium hydroxide solution,<sup>1</sup> and the vessel in which the digestion of

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<sup>1</sup> It is best to place the alkali in the separator while the alkaloids are being digested with the acids so that after the lapse of ten minutes, when the acid liquid is poured into the separator, the action of nitric acid upon the strychnine is quickly arrested.



the alkaloids had taken place is washed three or four times with very small amounts of water. The liquid in the separator will now be very turbid from the separation of strychnine. If this is not the case, there is not enough alkali, and a further addition of 1 or 2 c.c. alkali must be made. After the addition of sufficient alkali the liquid is shaken out three times, with chloroform, using 20 c.c. for the first shaking out and 10 c.c. each time for the two subsequent ones. The chloroformic solution is filtered through a small plain double filter arranged so that there are four folds of paper on each side into a light tared flask, taking care to wash the stem of the separator with a little chloroform; the filter and stem of the funnel are also washed a few times with small amounts of chloroform, and to the perfectly colorless solution of strychnine thus obtained are added 2 or 3 c.c. of pure amyl alcohol which distills between 128 and 132° C., and leaves no residue on evaporation.<sup>1</sup> The chloroform is now distilled off completely and the small amount of amyl alcohol left behind removed by keeping the vessel on the water-bath and blowing air over its opening, but so as not to blow out some alkaloid by the air current. The vessel is now dried for about two hours at a temperature of 135° to 140° C., and when cold weighed.

#### TINCTURE OF ACONITE.

By M. I. Wilbert.

The author calls attention to the fact that the official tincture of aconite is dangerously potent and that it is much stronger than the same preparations in other Pharmacopœias. The U.S.P. preparation is seven times stronger than that of the British, three and a half times stronger than the German, and nearly double the strength of that in the French Pharmacopœia. The author further says that at the present time there appears to be no tangible reason why this tincture should not be materially reduced in drug content, so as to bring it more in harmony with the same tincture official in foreign pharmacopœias, and also to make it conform with other tinctures of narcotic or active drugs in our own Pharmacopœia. He recommends that the strength be reduced to 15 per cent.

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<sup>1</sup> The amyl alcohol prevents very effectively the decrepitation of strychnine which unavoidably occurs on the removal of the last traces of chloroform by heat. See F. C. J. Bird, *Pharm. J. Tr*, September 8, 1900, 286.

## EXAMINATION OF PODOPHYLLIN.

By H. M. Gordin and C. G. Merrell.

The experiments of the authors tend to show that though we have no means at present to isolate quantitatively the active principle or principles of podophyllin, we can without difficulty tell whether a given sample of podophyllin is adulterated to a considerable extent or not. If we put up the following requirements for *pure* podophyllin it would be very difficult for an unscrupulous manufacturer to adulterate the resin so skilfully that the product will answer all the following requirements. It would, for example, be easy to adulterate podophyllin with another alcohol soluble substance, or an ether-soluble substance, etc., but it is hardly possible to find a substance that will behave toward the following requirements exactly like podophyllin. These requirements are as follows:

(1) Pure podophyllin must be completely soluble in about twice its weight of cold alcohol.

(2) It should contain about 64 per cent. ether-soluble and about 74 per cent. chloroform-soluble matter.

(3) It should contain about 22 per cent. crude picropodophyllin when assayed by the method described.

Before putting such requirements into the Pharmacopœia it would be advisable to prepare podophyllin from different samples of mandrake root, subject the different podophyllins so obtained to such an examination as here described, and in this way establish a mean value for ether and chloroform-soluble part, as well as for the amount of crude picropodophyllin which should be contained in this very important drug.

## THE AMERICAN MILK-PRODUCT INDUSTRY.

By Joseph W. England.

The author in a lengthy paper referred particularly to the manufacture of milk-sugar, casein and other products derived from cow's milk, and stated that to-day fully three-fourths of all the milk-sugar produced in the world and probably a larger proportion of casein is made in the United States. The paper is interesting in that it presents a historical resumé of the subject and gives the status of the milk-product industry in the United States to-day.

## SOME CURIOUS OILS.

By L. F. Kebler and Geo. R. Pancoast.

The authors have been collecting information for several years on some curious oils from various sources, viz.: Adder oil, angle-worm oil, ant oil, bait oil, bat oil, bear's oil, bear's fat, beaver's fat, brick oil, calendula oil, clover oil, catfish oil, crocodile and alligator oils, deer oil, dog oil, eel oil, fox oil, habacuc oil, hedgehog oil, lobelia oil, mullein oil, mink oil, mercury oil, mermaid's oil, ozonated oil, pickerel oil, porcupine oil, porpoise oil, rabbit oil, rat oil, raccoon oil, rhodium oil, rattlesnake oil, skunk oil, stillingia oil, stork oil, sturgeon oil, swallow oil, sweet cicely oil, turtle (green) oil, and viper oil.

## EXPRESSED OIL OF SWEET ALMONDS AND ITS SUBSTITUTES.

By Geo. R. Pancoast and L. F. Kebler.

The authors claim that oil of sweet almonds is fast becoming a commercial curiosity—being almost entirely supplanted by substitutes. They believe that but a small amount of oil is expressed from sweet almonds, nearly all of the sweet kernels in the market being used by the confectioners. The fluid obtained from bitter almonds is found in commerce, but it is labelled oil of sweet almonds. For every pound of the article imported, at least one hundred pounds of peach kernel (from *Prunus persica* Jess) or apricot kernel (from *Prunus armeniaca* L.) oils are also imported. They hope that in the future these oils will be properly labelled.

## STANDARDIZING DOSE MEASURES.

By M. I. Wilbert.

In this paper the author calls attention to the possible errors that might be caused either by the inaccuracy of the medicine-measures themselves, or by the fact that these measures are but poorly adapted for accurately measuring liquids in small quantities. The object in doing this being to have the Association, if possible, endorse the resolutions that were adopted at a recent pharmaceutical meeting of the Philadelphia College of Pharmacy.

The resolutions were adopted by the Scientific Section and subsequently at a general session of the Association.

## THE CREOSOTE QUESTION.

By William Mittelbach.

The author refers to the action of the A.Ph.A. regarding the nomenclature of creosote and said it was hoped that "coal-tar creosote" would be dropped from the price lists of manufacturers, etc. With but few exceptions coal-tar creosote is quoted as conspicuously as heretofore, one has it "commercial creosote," another quotes it "German creosote," and still another "the white from coal tar." The author contends that the use of the word creosote in connection with any other product except that from beechwood, should be made a violation of law, just as much as the word listerine when used by substitution. The author points out that many pharmacists and physicians buy the cheaper product regardless of its derivation, and they seem to care nothing for quality. It is the price apparently of the coal-tar product that keeps it in use and not the merits of the article.

## THE PRESENCE OF ARSENIC IN CHEMICALS.

By Lyman F. Kebler.

The author briefly reviewed the history of the Marsh test and made comparative tests between it and the other well-known methods used for detecting the presence of arsenic, such as Reinch's, Bettendorff's, Fleitman's, Gutzeit's, etc. From a series of tests made it was found that the Marsh-Berzelius test was much the superior and reliable.

Nearly the whole realm of medicinal chemicals was examined and many of them shown to contain arsenic. The most notable was sodium phosphate, of which one sample contained  $\frac{1}{65}$  of a grain of arsenic in 5 grammes of the material. Not a sample of glycerin was examined which did not contain arsenic. Honey was also examined and found practically free from arsenic, while on the other hand, tobacco appeared to contain a considerable amount.

NEW METHODS FOR THE MICROSCOPICAL EXAMINATION OF THE  
COMMERCIAL STARCHES.

By Henry Kraemer.

The author illustrated the effects which various reagents have on starch-grains by means of drawings, and said that (1) On the treat-

ment of the starches with chromic acid and other reagents certain distinctive and characteristic changes in the structure of the grains are brought about. There is the development of a crystalline-like structure, a central cleft or fissure, and finally a rupture or disintegration of the grain, all of which serve to differentiate the typical potato, wheat and corn-starch grains. (2) The use of stains, as gentian-violet and safranin, shows that there are distinct areas which hold the stain, except in the case of corn starch.

In working with other stains it was observed that a solution of fuchsin was decolorized on the addition of corn starch. This was at first thought to be due to a peculiarity of this starch, but it is apparently due to the traces of alkali contained in the commercial product as a result of its purification with alkalies. The question arises in this connection as to whether corn starch is the most desirable for pharmaceutical purposes and whether it should be recognized as the official starch.

#### EXAMINATION OF MILK.

By Mabelle Haydock.

After pointing out the sources of contamination of milk, and giving the rules to be observed in its proper care, the author gave methods for the detection of the various impurities found in milk.

#### OIL OF CLOVES: A PROBLEM IN PHARMACEUTICAL REVISION.

By Edward Kremers.

At the Minnetonka meeting the author read a paper on some of the general questions involved in the revision of the text of the volatile oils of the U.S.P., but failed to elicit a discussion. The oil of cloves was made the subject of a paper in order to present some of the difficulties that confront the revisor in establishing limits for so-called constants which vary not only with differences in the crude material and the methods of keeping the finished product, but also with changes in the methods of manufacture. Thus it has been claimed, e. g., that to-day no oil of cloves, the total product of distillation, conforms with the U.S.P. requirement of specific gravity. The fluctuations in the specific gravity of this oil are shown by a table of specific gravities covering almost a century. It would seem that greater allowance should be made as far as this constant

is concerned in describing oils, even though a wider range would seem to open wide the doors for adulterations. These will have to be guarded against in other ways.

#### OIL OF WINTERGREEN AND ITS ADULTERANTS.

By Edward Kremers.

The author does not pretend to present anything new on this subject, but has collected the available material in connection with his work on the revision of the pharmacopœial text of the volatile oils. In addition to the gross adulterants, such as turpentine oils, etc., the question of adulteration of true oil of wintergreen from *Gaultheria procumbens* with so-called oil of wintergreen from *Betula lenta* (sweet birch oil) and with synthetic methyl salicylate is discussed. The discussion of these substitutes and their possible detection naturally suggests the question of the therapeutic and ethical justification of the substitution of sweet birch oil and synthetic methyl salicylate for true oil of wintergreen.

#### GLYCEROPHOSPHORIC ACID AND GLYCEROPHOSPHATES.

By Edward Kremers.

On account of the unsatisfactory character of the pharmaceutical literature concerning glycerophosphates, which have acquired some prominence as therapeutic agents in recent years, the compilation of a monograph was undertaken by E. Kremers and T. G. Windes. In order to make such a monograph more satisfactory, experimental as well as literary investigations became necessary. Whereas the latter have been practically concluded, the former have been restricted almost entirely to the rate of esterification of glycerin and orthophosphoric acid under certain sets of conditions. In a general way the results show that the percentage of esterification increases with temperature and time, but that there are constant irregularities which manifest themselves very strikingly by plotting the results as curves. Some of the series of esterification experiments are to be repeated under greatly reduced pressure. The structure of the acid and the physical and chemical properties of the salts are also to be studied further. A complete report is to be made at the next annual meeting if possible.

## ORGANIZED WATER AS A FOOD.

By John Uri Lloyd.

The paper is interesting in that it is suggestive of the part that organized water plays as a food. The author asks, for instance, has the water that is used in the making of a soup, by the action of heat, simply dissolved certain salts and tissues, or has it combined with organic constituents in a way that will make a nourishing liquid or a series of water combinations, in which water exists, it is true, but with altered qualities? He further says that water is not seriously considered in the light of an integral part of food by any one, such solid substances as starch, sugar and nitrogenous and fatty tissues being usually cited as the constructive and heat-producing agents. Our works on digestion and on general physiology state that most foods are three-fourths water, and the human body, bones included, over two-thirds water, but yet consider water irrelevant as a nutrient. The upbuilding and tearing down of tissue, the production of salts and products of disintegration, both normal and abnormal, are studied solely from the basis of molecular change, in which nitrogen, hydrogen, carbon and oxygen play their respective parts as such.

The author states finally that possibly the makers of food products of the future will give less attention to analytical values concerning dead elements and more to vitalized and vitalizing structures in which available water is conspicuous. Possibly it behooves us even now to ask if a closer inquiry into the water molecule, the vitalized or easily vitalized water molecule and its many shadings, may not open up a field for the construction of more rational food products.

## COMPARATIVE STABILITY OF COLORS IN WALL-PAPER.

By John M. Lindly.

The author has examined into this subject, and concludes that it is doubtful if there is any color used in wall-paper that is absolutely permanent, but that the gilt and mica, or the gold and silver, in the specimens subjected to the long-time exposures, showed no alteration. Perhaps the most permanent wall-paper would be that with a white or buff back-ground with gilt and mica decorations.

RELATIVE STRENGTH OF VARIOUS PREPARATIONS OF DIGITALIS AND  
KINDRED DRUGS AS SHOWN BY EXPERIMENTS WITH FROGS.

By L. W. Faumlener and A. B. Lyons.

The authors experimented with digitalis as well as a number of other drugs that act like digitalis on the frog's heart. The authors conclude that (1) the determination of the relative strength of different samples of the same drug may be made with a precision sufficient for practical purposes by physiological experiments on animals. Duplicate determinations do not differ from one another as much as 10 per cent.—a difference which as yet we have to tolerate in chemical assays of such drugs as opium. (2) As might be expected, the relative medicinal strength of different drugs cannot be correctly inferred from the observation of a single symptom produced in an animal like the frog. Through a comparative study, however, of drugs by this manner we may hope to gain a more complete insight into the action of remedies, whose effects are usually a complex of several different influences over vital functions.

## DETERMINATION OF SODIUM CARBONATE IN SODIUM SULPHATE.

By Charles E. Caspari and Miles R. Moffatt.

The authors describe a method based on that proposed by Giles and Schearer (*Four. Soc. Chem. Ind.*, III, 197, and IV, 303) for the determination of sulphites. In accordance with the equation  $\text{Na}_2\text{SO}_3 + \text{I}_2 + \text{H}_2\text{O} = \text{Na}_2\text{SO}_4 + 2 \text{HI}$ , a definite amount of iodine which is used to oxidize the sulphite will give rise to the formation of a definite amount of hydriodic acid, and this amount of acid can be calculated from the amount of iodine consumed, so that the total amount of acid in the solution after titration is known, because when the excess of iodine is determined with thiosulphite no acid is formed, as the reaction takes place in accordance with the equation  $2 \text{Na}_2\text{S}_2\text{O}_3 + \text{I}_2 = 2 \text{NaI} + \text{Na}_2\text{S}_4\text{O}_6$ . If any carbonate had been present in the sulphite, it would have been neutralized by the hydriodic acid, which was formed in the oxidation of the sulphite, and at the end of the titration the amount of hydriodic acid present would not be equal to the amount calculated to be present from the amount of iodine used in the oxidation. Hence, the difference between the amount of hydriodic acid calculated to be present and the amount



actually found to be present is equivalent to the amount of carbonate originally present in the sulphite. The amount of hydriodic acid in the solution after titration with thiosulphate can be determined by direct titration with a tenth normal solution of sodium hydrate, using methyl-orange as an indicator, but it was found more satisfactory to add an excess of the standard solution of sodium hydrate and to determine the excess with tenth normal sulphuric acid, using the same indicator, because the end point is more easily recognized than when titrating from acid to alkali. Thus the amount of hydriodic acid present in the solution is found after the reaction of the iodine on the sulphite is complete and after the excess of iodine has been removed by thiosulphate. If this amount of hydriodic acid found be subtracted from the amount calculated to have been formed from the amount of iodine used, the difference is equivalent to the amount of sodium carbonate originally present in the sulphite. Of course, the method is equally applicable to the determination of sodium bicarbonate.

#### ASSAY OF MOIST OPIUM AND TINCTURES OF OPIUM.

By A. B. Stevens.

Before the lime method of assay can be applied to moist opium it is necessary that the moisture be determined; then 4 grammes of the dried sample are powdered and mixed with 2 grammes of freshly slaked lime and continuously rubbed with 10 c.c. of water; then proceed as in powdered opium.<sup>1</sup> The per cent. of morphine obtained multiplied by 1 minus the per cent. of moisture, and then the correction for loss of morphine is added.

Granulated opium should be powdered and rubbed with the lime and water at least fifteen minutes, or until a smooth paste is formed, and then proceed as in powdered opium.

*Tinctures of Opium.*—Evaporate 40 c.c. of the tincture to about 10 c.c., and rub with 2 grammes of freshly slaked lime; transfer to a graduated cylinder and add water to about 30 c.c.; then add five or ten drops of ether to destroy the foam upon the surface of the liquid; then add water to exactly 31 c.c. Agitate frequently for half an hour and filter off 15 c.c., and proceed as in powdered opium.

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<sup>1</sup> *Pharm. Archives*, 5, p. 41.

The number of c.c. of acid consumed multiplied by 0.15037, and then 0.112 added, will give the number of grammes of morphine in 100 c.c. of the tincture.

### THE ALKALOIDS OF ADLUMIA CIRRHOSA.

By J. O. Schlotterbeck and H. C. Watkins.

This is a continuation of the work commenced two years ago upon the root of the first year's plant. At that time only 100 grammes of the dry material was available and only one alkaloid, protopine, was identified. In this investigation, 20 pounds of the dry, entire plant of the second year's growth was employed. The authors state the difficulties met with in obtaining the drug and give their experience in the cultivation of the plant for the benefit of those who may at some later time wish to take up the work upon this subject.

The method of isolation of the alkaloids depends upon their liberation from combinations in the plant by means of very dilute ammonia water, drying the drug, extracting with chloroform, recovering the chloroform, extracting residue with warm, diluted acetic acid  $\frac{1}{2}$ –1 per cent., concentrating, precipitating with ammonia, shaking out with ether and separating and purifying by the selection of proper solvents.

Five distinct alkaloids were isolated, including protopine which was previously reported.

- (1) Protopine, M.P. 204–205°,  $C_{20}H_{19}NO_5$ .
- (2)  $\beta$ -homochelidonine, M.P. 159°,  $C_{21}H_{23}NO_5$ .
- (3) Adlumine (new), M.P. 188°,  $C_{39}H_{41}NO_{12}$ .
- (4) Adlumidine (new), M.P. 234°,  $C_{30}H_{29}NO_9$ .
- (5) (?) M.P. 176–177°.

These alkaloids were found to be in combination with at least two acids, viz.: citric and tartaric.

### THE COLOR COMPOUND OF STYLOPHORUM DIPHYLLUM AND CHELIDONIUM MAJUS.

By J. O. Schlotterbeck.

Many years ago Pröbst made a chemical examination of Chelidonium majus and obtained a bitter yellow color body which he named chelidoxanthin. To this body he attributed much of the

therapeutic activity of the plant, but he made no study of this substance further than to establish a few qualitative tests.

Later, Orlow published several articles upon chelidoxanthin and simple methods for its isolation by means of picric acid as a precipitant. He obtained an indefinite, yellow body only. During the course of an investigation upon the alkaloids of *Stylophorum diphyllum*, which, by the way, might properly be called a species of chelidonium, a crystalline color compound was obtained that answered the description of Probst's chelidoxanthin. The yield from 50 pounds of dry material was quite considerable, sufficient to make various salts and numerous qualitative tests. This compound, which has never been investigated since its discovery by Probst in chelidonium, was found to be berberine.

Fresh-growing plants of both *stylophorum* and *chelidonium* were examined and found to contain berberine.

#### PRELIMINARY NOTE ON THE ACTION OF HYOSCYAMINE AND ATROPINE.

By Arthur R. Cushny.

Pure Hyoscyamine from *scopola* and pure atropine from *belladonna* were prepared by Messrs. Prescott and Schlotterbeck and turned over to Dr. Cushny for pharmacological experiments. As far as completed, the research now in progress shows the following striking features: Hyoscyamine is twice as strong as atropine in checking salivary secretion and in dilating the pupil. The action on the nervous system is quite complicated and is being worked out at this time.

#### THE ACTIVE PRINCIPLE OF ERGOT.

By A. R. L. Dohme, Ph.D., and A. C. Crawford, M.D.

The controversy over the active principle of ergot is very old, and cannot be said at this writing to be in any more definite shape than it was years ago. The latest phase of the situation is that the Picrosclerotine of Dragendorff, the Ecboline of Tanret and the Cornutine of Kobert are more or less impure forms of what Hager is pleased to prefer to name Ergotinine  $C_{70}H_{40}N_4O_{12}$ , and which Keller has preferred to call Cornutine, although Hager considers these two identical. He also states that Ergotinine is very readily decomposed—

even citric acid in alcoholic solution converting it into the Cornutine of Kobert. Ten per cent. hydrochloric acid will do the same thing, and from this product, ether will only remove but little unaltered Ergotinine, while chloroform or ethyl acetate will remove remaining cornutine. Whatever alkaloid is present in ergot is there uncombined, and can be shaken out with ether. Hager says that the Spasmotine or Spacelotoxine of Jacobi is not a homogeneous body, but consists principally of Sphacelinic acid together with some alkaloid. Although Jacobi claims therapeutic activity for his Chrysotoxin  $C_{21}H_{24}O_{10}$ , an anthracene or phenanthrene derivative, Secalinotoxin  $C_{13}H_{24}N_2O_2$  an alkaloid, and Sphacelinotoxin a resin, especially for the last named, still Hager says a corroboration is necessary before this can be accepted. The balance of the evidence, according to Hager, points to the therapeutic activity being centered in Tanret's Ergotinine, and its decomposition product, Kobert's Cornutine. Kobert's Sphacelinic acid, identical with Wigger's Ergotin, is an acid poisonous resin, and the cause of ergotism, but not of ergot's therapeutic action. Holding rather to Keller than to Tanret or to Jacobi, we have always assayed ergot by the alkaloid obtained by his process of assay, and which he saw fit to name Cornutine, and which we have always named the Cornutine of Keller, to distinguish it from Kobert's Cornutine. Whether or not it is identical with Tanret's Ergotinine, we are not prepared to prove, and we will accept Hager's claim that it is. We have for some years successfully assayed ergot and its preparations, by Keller's method of assay, and we believe we can present some facts that will pharmacologically verify our view. The method consists of the following processes:

The fluid extract is evaporated on water-bath to remove the alcohol, and the residue is rubbed up with magnesia and water. This alkaline mixture is shaken for two hours with stronger ether, and the ether drawn off and in turn shaken with weak solutions of hydrochloric acid. The acid solutions are made alkaline with ammonia and again shaken out with ether. The resulting ethereal solution is then evaporated in a tared capsule and weighed. Whether or not this yields us absolutely pure Cornutine does not especially concern us at this time, as long as we know it represents all the therapeutic activity of the drug and the alkaline mother liquors from which it was extracted do not any longer contain any

such active principles. The points to be decided in our work are: (1) are the active principle or principles obtained as the product of our assay physiologically active in the sense of constricting the arterioles? and (2) is the mother liquor of the fluid extract from which these were extracted devoid of such physiological activity?

Experiment I.—Black rooster, weight 5 pounds. Before the injection, the wattles and comb were red and warm. 5 c.c. fluid extract of best Spanish ergot were injected hypodermically at 10 A.M.

At 10.35 A.M. Comb bluish but warm, wattles still red and warm.

At 11 A.M. Comb and wattles blue and cooler.

At 11.40 A.M. Comb and wattles very blue and much cooler.

At 3.30 P.M. Comb and wattles still very blue and cool.

Rooster's bill open and rooster looking quite sick.

Conclusion: Fluid extract of ergot quite active.

Experiment II.—The Cornutine of Keller obtained from 5 c.c. of this same fluid extract was dissolved in weak acetic acid and diluted so as to correspond in amount to the original fluid extract used. Injected 5 c.c. of this liquid at 10.35 A.M. hypodermically into the same rooster.

At 11.30 A.M. Comb blue and cool all over, bill wide open, wattles bluish and cool.

At 12 M. Comb much bluer and cool, wattles blue and cool.

At 1.30 P.M. Comb deep blue and cool, wattles very blue and cool.

At 4.20 P.M. Comb and wattles still both very blue all over and very cool.

Conclusion: The effect of the Cornutine of Keller is identical with that of the fluid extract.

Experiment III.—Filtrate obtained after removing all the Cornutine by Keller's method of assay was neutralized, made up to 10 c.c. and injected hypodermically into the same rooster at 9.45 A.M.

At 10.48 A.M. Slight bluing at two tips of comb, wattles still red and both warm.

At 1.40 P.M. Comb and wattles still warm and both quite red.

Conclusion: All of the fluid extract except the Cornutine of Keller does not cause vaso-constriction, and it is hence not active physiologically.

Experiment IV.—Gray and white rooster, weight 5 pounds.

Injected hypodermically with 5 c.c. fluid extract ergot assaying 0.25 per cent. Cornutine of Keller at 9.16 A.M., wattles and comb red and warm.

At 9.37 A.M. Comb bluish and cooler, wattles beginning to blue.

At 9.56 A.M. Comb very blue and cold, wattles very cold and blue.

At 11.36 A.M. Comb very blue and cold, wattles very cold and blue.

Experiment V.—Cornutine of Keller from the fluid extract used in experiment IV injected hypodermically into same rooster at 8.30 A.M., wattles and comb red and warm.

At 9 A.M. Comb and wattles decidedly blue and cool; bill open.

At 10 A.M. Comb and wattles very blue and cold; bill open, and panting.

At 1 P.M. Comb and wattles still very blue and cold.

Experiment VI.—Filtrate from assay of experiment V neutralized and injected into the same rooster, his comb and wattles being red and warm at 9.35 A.M.

At 9.59 A.M. Comb and wattles still red and warm.

At 10.39 A.M. Comb pale bluish on one tip and warm; wattles red and warm.

At 12 M. Comb pale bluish on one tip and warm; wattles red and warm.

At 1.50 P.M. Comb and wattles still red and warm.

Experiment VII.—Black and white rooster, 4 pounds. Comb and wattles red and warm. Injected 5 c.c. fluid extract ergot at 10.53 A.M.

At 11.10 A.M. Comb and wattles still warm and red.

At 11.31 A.M. Comb bluish at tips, comb and wattles cooling.

At 11.47 A.M. Comb bluer, wattles pale and cooler.

At 12.09 P.M. Comb bluer, wattles pale, almost white and cool.

At 12.55 P.M. Comb much bluer and cold, wattles whitish and cold.

At 2 P.M. Comb very blue and cold, wattles white and cold.

At 5 P.M. Comb still blue at tips and cool, wattles pink and cool.

At 8.40 A.M. next morning. Comb and wattles red and warm.

Experiment VIII.—Black rooster, 5 pounds. Wattles and comb red and warm. At 12 M. injected 5 c.c. Cornutine of Keller obtained from fluid extract ergot in experiment VII.

At 12.27 P.M. Comb bluing, wattles red.

At 12.55 P.M. Comb very blue, wattles paler.

At 1.45 P.M. Comb dark blue and cold, wattles blue and cool.

At 4.15 P.M. Comb very blue and cold, wattles very blue and cold.

At 4 55 P.M. Comb very blue, wattles still blue.

At 8.10 A.M. next day. Tip of comb still blue, wattles pale.

At 8.20 A.M. day after. Comb and wattles still pale and cool.

Experiment IX.—Black rooster, 5 pounds. Comb and wattles red and warm; at 12.35 P.M. injected filtrate from experiment VIII, representing all of the fluid extract but the Cornutine of Keller.

At 1 P.M. Comb tips slightly blue, wattles red.

At 1 15 P.M. Comb tips still pale blue, wattles red and both warm.

At 1.55 P.M. One tip only bluish, wattles red.

At 3 P.M. Both wattles and comb red and warm.

These experiments (1) show that the fluid extracts of ergot used contained active principle or principles that cause vaso-constriction; (2) that the product of the assay for the Cornutine of Keller causes fully as much constriction of the arterioles, and is hence at least part, if not all, of the efficient part of ergot that causes vaso-constriction; (3) that what is left of the fluid extract of ergot does not contain much, if any, of those active principles of ergot which produce vaso-constriction and which are generally considered to represent the efficiency of ergot, and finally, (4) that the assay of fluid extract ergot for Keller's Cornutine is a correct means of standardizing this drug for its vaso-constriction virtues or what is generally considered to be its therapeutic efficiency.

#### CONTRIBUTIONS TO THE PHARMACOLOGY OF NARCOTINE.

From the Research Laboratories of Sharp & Dohme. By A. C. Crawford, M.D., and A. R. L. Dohme, Ph.D.

The opinions as to the physiological activity of narcotine have varied widely. It was considered by its discoverer, Derosne, to be the active principle of opium, whence its name, but recently Palmer has suggested the name anarcotine, from its lack of narcotic properties. The reports of the earlier experimental work vary widely, no doubt owing to imperfect methods of isolation. Von Schroeder

considers their perusal worth very little, owing to the lack of details as to the purity of the narcotine used. The historical details which follow have been taken from his work (*"Archiv f. exp. Path.,"* Vol. 17, 1883, p. 100).

The first to study the action of narcotine on animals was Orfila (*"Lehr. d. Toxikol.,"* 1853). He claimed that the character of the action depended largely upon the solvent; thus, dissolved in olive oil 0.4–0.6 gramme narcotine, first accelerated the respiration (dog) then produced a condition of stupor, which was followed by death. Slight convulsive movements of the limbs preceded death. A dose of 1.3 grammes dissolved in dilute acetic acid accelerated the respiration and caused severe convulsions, followed by stupor and death, while 2 grammes dissolved in hydrochloric or nitric acid produced no toxic symptoms.

Magendie believed it to be the excitant principle of opium, as after the administration of 0.03 gramme he experienced some excitation and headache, and dogs under its influence had convulsive movements.

Small doses, according to Bailly (*"Rev. med.,"* 1825) are inactive in man, while large ones, 3–3.5 grammes, induce merely headache and slight nausea. After a dose of 7 grammes, one of his cases merely experienced slight giddiness.

Charvet (*"Die Wirkung des Opiums,"* 1827) found that narcotine caused only slight acceleration of his pulse. He claimed the administration of 1 gramme to rabbits was followed by slight trembling and increase in reflex excitability, later by death.

Cogswell (*Lancet*, 1852) saw no action in frogs from 1 gramme, while Albers (*"Archiv f. Path. Anat.,"* Vol. 26, p. 225) claimed that the injection of 0.05–0.1 gramme as powder into frogs, caused numbing of sensation, and narcosis, and recommended its clinical use in cases of abnormal sensibility.

Bernard (*"Compt. rend.,"* Vol. 59, p. 406) denied any narcotic action.

Schroff (*"Pharmakologie,"* 1856, p. 476) noted in man that the administration of 0.1 gramme caused slight rise in pulse rate, followed by a fall, accompanied by dilatation of the pupil, deepening of the respiration and sleepiness; the action was transitory.

Baxt (*"Arch. f. Anat. u. Physiol.,"* 1869, p. 112) claimed that 0.1 gramme used subcutaneously in rabbits and guinea-pigs was



inactive, while 0.02–0.04 gramme in frogs induced a comatose condition, which was followed by convulsions.

Eulenburg ("Hypoderm. Injection d. Arzneimittel," 1875) noted an acceleration in pulse rate (man) and in respiratory frequency, with a rise in temperature. He believed that there was very slight, if any, narcotic action.

Barbier's Reports ("Traité de mat. med.") differ very much from those from the use of pure narcotine.

We undertook this study in the hope of obtaining data to form conclusions as to the advisability of denarcotizing opium—a question now under discussion by the Committee on Revision of the United States Pharmacopœia. Warm-blooded animals were especially used because of their closer relationship to man, and in all experiments involving pain, the animals were anesthetized with acetone-chloroform, urethane or ether.

We used, at first, narcotine isolated by the method described in Schmidt's "Pharmaceutische Chemie," 3d Ed., Vol. 2, p. 1894, but most of the work was done with narcotine pure, of Merck; this they declare to be "perfectly pure." Neither gave the morphine reaction with selenious acid dissolved in concentrated sulphuric acid, and the narcotine of Merck, which alone was tested, gave no blue violet color, showing the absence of papaverin (Huseman-Liebig "Annalen," Vol. 128, p. 308). Melting-point 176° C. (Vanderkleed).

#### GENERAL ACTION.

The administration of from 16 to 64 milligrammes by mouth to one of us (weight, 133 pounds) caused no appreciable disturbance, no drowsiness or change in temperature (before experiment, 98.5° F., after experiment, 98.4° F.) and did not produce constipation or any disturbance in pulse rate.

Daily doses of from 0.12 to 0.8 gramme have been used for migraine associated with malaria, and the only untoward symptom has been some weakening of the pulse. ("Semaine med.," 1896, No. 14, quoted by Kunkel, "Handb. d. Toxikol.," Vol. 2, p. 820.)

The usual dose for intermittent fever cases is given as from 1½ to 3 grains. (Roberts, "Lancet," Vol. 2, 1895, p. 306.) See also "Brit. and Foreign Med. Rev.," Vol. 8, 1839, p. 263).

In small dogs (16–24 pounds) the subcutaneous injection of 16

to 300 milligrammes merely induces slight drowsiness, with acceleration of the respiration, while larger doses, 0.5 gramme, produce slightly more marked dullness and disinclination to move, in one case some stiffening of the limbs and marked salivation; at times tremors and restlessness are seen; but in every case, with one exception, the dogs would come to you on being called. Unlike morphine, it induces no vomiting or purgation in dogs.

A cat (8 pounds) and a rooster (5 pounds) in our hands were apparently unaffected by 64 milligrammes hypodermically.

Rabbits were used by v. Schroeder. He found that 0.5 gramme per ounce caused, in fifteen to twenty minutes, slight trembling with some restlessness; then followed, for about one-half to one hour, a stage of increased reflex excitability, then a return to normal. The narcotic action was very slight and uncertain in appearing. After the administration of 1.2 grammes, the stage of excitement is succeeded by one of depression, in which paralytic symptoms appear, and death in about forty hours.

In frogs, the hypodermic injection of 0.05-0.07 gramme produces a somewhat similar picture; first, a stage of diminished reflex excitability, followed by one of increased reflex excitability, and later by paralysis (v. Schroeder). This paralysis is mainly central in origin, although the excitability of the motor nerves is diminished. Pigeons which are immune to morphine die with convulsions from 0.15 gramme narcotine (Liebreich, "Encyc. d. Ther.," Vol. 3, p. 204) so that in animals, any narcotic effect is very slight and often uncertain.

The injection of narcotine powder under the skin in frogs is not followed by symptoms of narcotine poisoning, as it is practically unabsorbed in this condition (V. Schroeder). Its salts are very unstable, so that it should be used in weak hydrochloric acid solution. We used for most of our work, solution made by dissolving narcotine in HCl N/20 and controlled the experiment with HCl N/40, calculating that the difference in acidity of these solutions would be neutralized by the affinity of the narcotine. On this solution, moulds grow if left long.

Numerous experiments upon cats, dogs, rabbits and frogs, as well as upon adult men (full details of which will be found in the Proc. A.Ph.A., 1902) have indicated that the following conclusions are justified:

(1) That narcotine intravenously injected, causes a fall in blood pressure, which is mainly due to a direct action upon the heart itself.

(2) That the pulse rate is slowed and the cardiac nerves are unaffected.

(3) The narcotic action is slight.

(4) The respirations are increased in frequency, but the individual respirations are lessened in volume—just the opposite of heroin.

(5) The salivary secretion is at once arrested by small doses, but large doses may increase it.

(6) The amount of biliary secretion is uninfluenced.

(7) The intestinal movements are quieted.

(8) The renal secretion is diminished by its intravenous or subcutaneous use, but small doses per os are inactive.

(9) It is partially eliminated by the urine and partially by the stomach.

(10) We have no reason to believe that small doses of narcotine are injurious. Any unpleasant action the undenarcotized tincture of opium may have, is probably due to the so-called odorous principles.

(11) It does not reinforce the action of morphine.

#### MECHANICAL AGITATION.

By A. B. Stevens.

The apparatus is constructed on the principle of the Ferris wheel, with four arms, except that the cars are not suspended. The bottles or flasks are placed in a felt-lined trough, and in the case of bottles a second trough is placed over the bottles and held in place by a strap. When flasks are to be agitated they are placed in the trough in an upright position, and a piece of board with holes to fit the flasks is placed over the necks of the flasks and then held in position with the strap. Any amount of liquid, from a few cubic centimeters to a gallon, may be agitated at one time. The apparatus is run by a small water or electric motor.

#### SEPARATOR HOLDER.

By A. B. Stevens.

This consists of an ordinary retort ring, with about an inch of the front part of the ring removed by cutting it out with a hack

saw or cold chisel, thus allowing the separator to be placed directly in the support without danger of bringing the stop-cock in contact with the ring, as is apt to occur when the separator is inserted or removed from the ordinary ring.

### ORGANIC QUALITATIVE ANALYSIS.

By E. H. Bartley.

The author gave a scheme for the qualitative separation of organic compounds. The principal sub-divisions are determined as follows: (a) Heat a portion of the substance on a platinum foil over the naked flame, first gently and then at a red heat, and observe its behavior, odor, etc. (b) Heat a small portion of the solid, or of the liquid, in a clean, dry test-tube or matrass, and note its behavior. (c) Heat a small portion of the solid or liquid with dilute sulphuric acid and observe any change of color, effervescence or odor. (d) Warm a small portion of the solid or of the liquid with 50 per cent. of sulphuric acid. (e) Warm (do not boil) with strong sulphuric acid. (f) Heat to nearly boiling a fragment of the substance with dilute Fehling's solution. (g) Heat a neutral solution of the substance with nearly neutral ferric chloride solution, noting color produced or precipitate formed. (h) Detection and removal of water and determination of ultimate analysis by application of special tests as for detection of hydroxyl, etc.

### OTHER PAPERS.

Other papers were presented as follows: "The Alkaloids of *Eschscholtzia Californica*" and "The Alkaloids of *Dicentra Cucularia*," by R. Fischer.

### SECTION ON EDUCATION AND LEGISLATION.

The Chairman of the section, E. G. Eberle, presented an unusually able and interesting address, which was devoted to a review of the progress in education and legislation in this country, and contained a number of recommendations looking to the betterment of pharmacy. An interesting feature of the Section was the report of the "Committee on Habitual Use of Narcotics" by the Chairman, H. P. Hynson, which will be published in full in this JOURNAL.

The committee was continued and a motion carried requesting Professor Beal to draft a law regulating the sale of narcotics.

A resolution regulating the free distribution of antitoxin and vaccine virus by Boards of Health was read as follows:

*Whereas*, We, the members of the American Pharmaceutical Association, believe that the manufacture and wholesale free distribution of antitoxin and vaccine virus by Boards of Health throughout the United States are liable to grave abuses and unjust to those who are engaged in the manufacture of these products; and

*Whereas*, There is, in our opinion, no more reason for such extravagant expenditure of the public funds than there is for the wholesale free distribution of food and clothing; and

*Whereas*, It is well known that serums and vaccines are furnished to thousands who are in no need of charitable aid; and

*Whereas*, The experience in St. Louis, Mo., where fourteen children lost their lives through the use of impure antitoxin manufactured in the laboratory of the St. Louis City Board of Health, directs attention to the inexpediency of intrusting the making of such preparations to Boards of Health dominated by political influences; and

*Whereas*, It has been found that where Boards of Health have the power to manufacture or give away vaccine virus or antitoxin the sales of the article by druggists even in favored localities have been seriously interfered with; be it

*Resolved*, (1) That it is the sense of the American Pharmaceutical Association that Boards of Health are acting beyond the duties especially assigned them in the manufacturing, selling or giving away, except to the destitute, any remedial agents, serums, vaccines, etc. (2) That in so doing they interfere with the discharge of their own legitimate duties, the interests of manufacturers, retailers and the drug trade generally, to the detriment of the whole community.

The resolutions were adopted, and the secretary of the Association instructed to lay the resolutions before Congress, the several State Legislatures and the municipal governments of the principal cities of the United States.

The following officers were elected for the ensuing year: Chairman, J. W. T. Knox; Secretary, Harry B. Mason; Associates, G. T. Gable, M. W. Bamford and C. A. Mayo.

The following papers were presented to this Section:

## DISPENSING BY PHYSICIANS.

By C. S. N. Hallberg.

The author discussed the ethics of apothecaries prescribing and of physicians dispensing, and showed the harm that may result from the miscellaneous use of or dependence upon tablets. Physicians should use blanks ordering pharmacists not to refill prescriptions without the physician's authority, and pharmacists should observe this order. After an interesting discussion a resolution was passed discouraging the unauthorized refilling of prescriptions.

## KICKING AGAINST THE PRICKS.

By H. B. Mason.

The author says that the department store represents a higher step in the evolution of commerce; it is the result of natural "selection;" it is more efficient than the small store—more capable of succeeding in the struggle for existence; and it will continue to grow and develop despite all efforts to abolish it, and absolutely regardless of the classes or the individuals whom it treads under foot in its progress onward and upward. To cry out against this fate is worse than useless. To attempt its prevention is merely to kick against the pricks, or, Don Quixote-like, to tilt one's lance against a windmill.

## NOW IS THE TIME.

By Joseph P. Remington.

Eleven years ago a resolution was offered at the meeting of the American Pharmaceutical Association asking this body for its support of the proposition to require each pharmacy board to demand from each candidate for proprietor's certificate a college diploma or evidence that the candidate had passed the examination necessary for granting such diploma. The author now considers the time ripe for the appointment of a committee to draw up a strong appeal to be sent to every graduate of a college of pharmacy in the United States, asking each one to use his influence, and work actively for the passage of a law in his State, demanding that, in future, each candidate for a *proprietor's* certificate shall first produce evidence before the board that he has successfully passed his examination

before a college of pharmacy or department of pharmacy in a university, granting him a degree which will evidence a systematic training in the theory and practice of pharmacy.

#### ÆSOP'S ADVICE TO COLLEGES OF PHARMACY.

By R. G. Eccles.

The author recalls the fable of the Boy and the Filberts and concludes, from an examination of the catalogues of most colleges of pharmacy, that there is a tendency to do too much. He advises a careful consideration of the plan so rapidly gaining favor in our highest colleges and universities, of having students select from the many chairs those which shall be their choice, and demand a certain number of studies and a definite result.

#### UNIFORM PHARMACY LAWS.

By Albert E. Ebert.

The author suggests that an agreement be reached on certain fundamental features provided in pharmacy laws, and that the requirements for entrance into pharmacy deserve the first consideration. He further contends that no one should be accepted for examination by a board of pharmacy unless he can show evidence of preparation in the form of a systematic course of instruction at some recognized teaching institution.

#### A PLEA FOR A NATIONAL BOARD OF PHARMACY.

By W. C. Alpers.

The author states that the establishment of a National Board of Pharmacy would not interfere with State rights and contends that there should also be a National Board of Medicine and Pharmacy, to consist of prominent physicians and pharmacists from all over the country, each branch to conduct its own special examinations separately but under a general joint supervision.

#### A PLEA FOR HIGHER COLLEGE ENTRANCE REQUIREMENTS.

By W. M. Searby.

The author advocated a high-school education as a preliminary requirement of matriculants entering colleges of pharmacy. He

said that superior training made better students, and that the student of slender means was usually the one most benefited by securing a high character of preliminary education.

#### PHARMACEUTICAL TESTING AS A PART OF THE COLLEGE COURSE.

By L. E. Sayre.

In discussing the subject relating to the testing of pharmaceutical chemicals, the author referred especially to those chemical salts and preparations which are liable to adulteration, as, for example, potassium iodide, potassium bromide, syrup of the iodide of iron, sweet spirit of nitre, etc. He referred to the fact that the United States Pharmacopœia in its text gave explicit directions for testing these chemicals. The question arises how shall this material be utilized in educational work. The author contended that it should be made a special course, the preparation for which should be a training in qualitative and quantitative analysis, such as is given ordinarily in college courses.

#### LANTERN SLIDES.

By Otto A. Wall.

An abstract of this paper was presented by H. M. Whelpley. The paper is devoted to the consideration of the preparation as well as use of lantern slides for illustrative purposes.

#### USE AND ABUSE OF PROPRIETARY MEDICINES.

By M. I. Wilbert.

The author referred to the growing use and consequent abuse of proprietary medicines by American physicians, and says that in looking over the advertising pages of medical journals the medical preparations advertised in them may be classified under one or the other of the following headings:

(1) Proprietary articles, or compounds having their therapeutic uses, and the doses in which they are to be taken, prominently displayed on the label or the reading matter that accompanies the package.

(2) Proprietary articles that, in addition to the points enumerated above, are also advertised in the lay journals, and are designed particularly for popular use.



(3) Proprietary medicines that have the complete, and not a misleading, formula on the label; the manufacturer claiming no further proprietorship than the careful compounding of selected ingredients.

(4) Proprietary articles advertised and sold under false pretenses. The wording of the advertising matter that accompanies preparations of this class, is usually of such a nature that it intentionally misleads the average individual as to the true composition of the article. In addition to this, these compounds usually come under the headings of class one or two.

(5) Chemical compounds that are definitely and positively recognizable as such. A true chemical substance is one the composition of which is well known, and for which there are certain definite chemical tests, by means of which it may be recognized or tested as to its purity.

(6) Foods, and food products, including such substances as extract of beef, condensed milk, and the immense number of mixtures, composed chiefly of starch and fermentable sugars, that are offered as substitutes for, or as improvements on, mother's milk for the feeding of infants.

(7) Mineral waters. Under this heading we may group all natural as well as artificial mineral waters.

The author discusses the medicines of the different classes and says: Whether or not it is legitimate and proper for a professional man or a physician to virtually become the advertising or sales agent of the manufacturer, under the pretense of giving professional advice, for which he in turn expects remuneration, is a subject that should be given more attention in the deliberations of medical societies, with a view of enforcing existing codes of ethics.

#### NARCOTICS AND THE HABITUÉS.

By E. G. Eberle.

The writer concludes that laws that prevent the sale of narcotics benefit the public financially and morally. The public must aid by interesting themselves in the observance of the laws. The moral obligations are more forceful than legal penalties, except with the individual who sees nothing but the money in it, and who must be ferreted out and punished in accordance with the penalty invoked.

The doctor must desist from advertising the narcotics, whenever he uses or prescribes them. The secret use of them must be prevented as much as possible through registration of the sale. This does not mean that the information shall become public, other than to authorized legal agents; but the fact that the user knows his name frequently appears on record as a purchaser is sufficient to make him or her stop and think of the affliction, and perhaps in the moments of sound reason gather courage to battle against the use of the narcotic.

#### WHAT EDUCATIONAL QUALIFICATIONS SHOULD A COLLEGE OF PHARMACY DEMAND OF ITS PROSPECTIVE STUDENTS?

##### WHAT OF ITS GRADUATES?

By Frank E. Fisk.

The author is of the opinion that colleges of pharmacy should demand of prospective students, as a foundation for the study of pharmacy, the *equivalent* of a high-school education, which, however, need not be acquired at a high school, registration as apprentice, to the drug business by a State Board of Pharmacy by examination, and an actual apprenticeship of at least one year under a competent person in a pharmacy; and that colleges of pharmacy should require of their graduates educational qualifications that best equip them for the pursuance of their chosen profession, fulfilling their own mission meanwhile by providing such changes in equipment and curricula in addition to the best efforts of the faculty, as seem to be demanded by the pharmaceutical profession in its constant evolution.

#### LABORATORY TEACHING OF MATERIA MEDICA.

By R. A. Hatcher.

The author states that he has obtained encouraging results by having the students test the various drugs for their chief constituents whenever practicable, expecting them to keep laboratory notes to be used in connection with the lectures.

## MORAL RESPONSIBILITIES.

By Clement B. Lowe.

The author considers the use of intoxicants by employees and others, and refers to the pernicious practice of the giving of shares of stock in companies controlling proprietary articles to physicians and others who shall push their preparations.

An interesting feature of the program of this section was the letters from some of the ex-presidents of the Association:

John F. Hancock read an interesting paper on "Reminiscences," calling attention to the incidents of the inception of the Association and the character of the early work done by its members, and paid a glowing tribute to the labors of Procter and Parrish.

George W. Sloan referred to the distinguished apothecaries who organized and have since conducted the affairs of the Association.

E. L. Patch took for his theme the "Past, Present and Future," and referred to the growth of the Association and to the progress in teaching in our colleges and schools of pharmacy. In conclusion he said that the future of pharmacy will be largely influenced by what its votaries are aiming for and accomplishing to-day.

A. E. Ebert referred to the desirability of uniformity in laws regulating the practice of pharmacy in the various States of the Union, and stated that a bureau of public health might be organized as a division of the Department of the Interior, and might be given control of such affairs as pertain to the health of the people as a whole, and over which the government now exercises supervision, for example, quarantines. The establishment of such a bureau might serve as a base for further action, and as the public mind becomes educated to the importance of the subject, greater powers would be entrusted to this bureau—by constitutional amendment if necessary.

H. M. Whitney's letter was reminiscent in character, and also touched upon the matter of pharmacy legislation.

John F. Patton stated that he was of the opinion that it will be a long day before we can get any legislation of a national character in the interest of pharmacy, except it be along the line of pure foods, which would deal more with chemistry than pharmacy. We can, however, prevent legislation that would be inimical to our interests. This is work usually developed in State legislation, and would naturally be taken cognizance of by the Legislative Committees of our State Pharmaceutical Association.

## SECTION ON PRACTICAL PHARMACY AND DISPENSING.

Owing to the resignation of the chairman of this section elected at the last meeting of the Association, the chairman's address was dispensed with and H. P. Hynson presented an address embodying the replies from the members of the Association on questions of practical interest. The Enno Sander Prize was awarded to William F. Kaemmerer, the presentation being made by Dr. Sander. C. Lewis Diehl read the report on the National Formulary, embodying the criticisms which he had received from A. B. Stevens, H. A. B. Dunning and others.

An interesting feature of this section was the re-reading of the first paper ever read before the American Pharmaceutical Association, by its author, Alpheus P. Sharp, Baltimore. The paper was entitled "The Strengths of Commercial Muriatic and Nitric Acids and Alcohol," and was presented at the meeting held in New York in September, 1855. A special vote of thanks was tendered Mr. Sharp for his courtesy in re-reading his paper.

J. U. Lloyd exhibited the Chapman suppository mold, which was invented by Dr. Wm. B. Chapman, Cincinnati, in 1864-1865. He originally used a base consisting of cacao butter mixed with 10 per cent. of Japan wax.

H. A. B. Dunning read a paper on "Aromatic Waters as a Cause of Precipitation," and advocated the use of filter paper in the preparation of these waters, as the calcium phosphate used in their preparation causes a precipitation of Fowler's solution, lime water, etc. Purified talcum is considered better than the unpurified phosphate, whereas the filter-paper method gives a clearer and stronger solution which does not become musty.

Wilbur L. Scoville read a paper on "Colognes and Toilet Waters," and gave a number of formulas for the preparation of these together with the cost of same. He considers it a mistake to use musk in their preparation and advocates the use of a fine quality of Siam or vanilla benzoin. C. V. Emich had a historical paper on the practice of pharmacy fifty years ago. Various pieces of apparatus and pharmaceutical devices were shown, among which the following may be mentioned: Wm. C. Alpers described an exhibit of prescription and office furniture which he has in use in his store. Walter S. Reid, Baltimore, as well as W. F. Kaemmerer described their

methods of filling prescriptions. Wm. Mittelbach illustrated the manner in which he keeps the records of his laboratory work. C. T. P. Fennel, Cincinnati, had a historic exhibit of changes in prescriptions during the past fifty years. Geo. M. Beringer exhibited some "Plaster of Paris Molds" made probably in 1840. T. D. McElhenie collated some dispensary notes. F. W. Schueller exhibited a device for the preparation of spotted plasters, and W. F. Kaemmerer had several papers which were read by title, viz.: "Some Observations on Syrup of Iodide of Iron" and "Comparative Value of Purified Talcum and Calcium Phosphate as Clarifying and Distributing Agents."

The following officers were elected for the ensuing year: Chairman, George M. Beringer; Secretary, W. H. Burke, Detroit; Associate, H. A. B. Dunning, Baltimore.

#### SECTION ON COMMERCIAL INTERESTS.

The address of the Chairman, F. W. Meissner, Laporte, Ind., was timely in that he advocated a closer affiliation between the N. A. R. D. and A. Ph. A. He said that the formation of the National Association of Retail Druggists was caused by the determination of druggists whose commercial interests had been interfered with, to secure for themselves all the benefits obtainable from co-operation by those whose interests were alike disastrously affected. It was an indication that the American Pharmaceutical Association was not yielding (probably because of structural peculiarities or other reasons), the needed protection. It is greatly to the credit of the N. A. R. D. that since its formation that Association has carefully minded its own business, has co-operated with us wherever it could find an opportunity and has at all times becomingly acknowledged the pre-eminence of the American Pharmaceutical Association because of its honorable career of usefulness and its undoubted worth in certain fields.

A number of interesting papers were presented, among which the following may be mentioned:

Louis Schulze presented a paper on "The Commercial Value of Pharmaceutical Legislation," in which he pointed out that by compelling pharmacists to be educated men, a higher grade of manhood is introduced into the profession, and the number necessarily decreased, which brings about an increase in trade; furthermore,

men of such standing can be more readily appealed to to maintain prices, as well as made to realize the necessity of a reasonable profit in goods handled by them. Restriction of sales of abortives and powerful narcotics by pharmacists should be made from a moral rather than a commercial side; nevertheless it also has its commercial value, as it prevents their being sold by general merchants, hence restricts competition. By preventing sales of inferior and adulterated drugs, the pharmacist is benefited commercially from the fact that his competitor must handle the same quality of drugs.

H. A. B. Dunning pointed out the value of chemical analysis in the estimation of chemicals purchased by the pharmacist. Wm. F. Kaemmerer presented a paper on "The Pharmacist and His own Preparations," and said that it was a mistake for the pharmacist to put up as his own anything which is not made by himself, and that it was a still greater mistake to put up any preparation of his own simulating in shape or style of package that of some other manufacturer.

John Hargreaves, Toronto, presented "A Price Protective Plan," which he claimed was the only successful plan for controlling the prices of proprietary articles.

#### SPECIAL JUBILEE SESSION.

The Special Jubilee Session in commemoration of the fiftieth anniversary of the Association was held at the Philadelphia College of Pharmacy, on Thursday afternoon, September 11th. The meeting was called to order by the President of the Association, H. M. Whelpley, who made a few opening remarks in which he deplored the absence of Fr. Hoffmann, of Berlin, who had been invited to preside at this session. He then asked Charles Caspari, Jr., to read an abstract of the address prepared by Dr. Hoffmann for this occasion. Before reading the paper Professor Caspari stated that Dr. Hoffmann had requested him to deliver a special message to the Association explaining the necessity for his absence. Dr. Hoffmann had come to this country several weeks ago, but, on account of heart trouble and other complications, his physicians here had advised him to return home. He deeply regretted the necessity for his return, as he took a keen interest in the occasion. The address of Dr. Hoffmann is a lengthy one and devoted to a retrospect of the development of American pharmacy and the American Pharmaceutical Association, and is a valuable contribution to the subject.

The President of the Association then stated that there were twenty-one living ex-presidents, of whom eighteen were present, and invited these to rise and stand while their names were called. The following are those who were present:

W. J. M. Gordon, 1864, Cincinnati; E. H. Sargent, 1869, Chicago; Enno Sander, 1871, St. Louis; Albert E. Ebert, 1872, Chicago; William Saunders, 1871, Ottawa; John F. Hancock, 1873, Baltimore; C. Lewis Diehl, 1874, Louisville; George W. Sloan, 1879, Indianapolis; James T. Shinn, 1880, Philadelphia; John Uri Lloyd, 1887, Cincinnati; Joseph P. Remington, 1892, Philadelphia; Edgar L. Patch, 1893, Boston; William Simpson, 1894, Raleigh, N. C.; James M. Good, 1895, St. Louis; Henry M. Whitney, 1897, North Adams, Mass.; Charles E. Dohme, 1898, Baltimore; A. B. Prescott, 1899, Ann Arbor, Mich., and John F. Patton, 1900, York, Pa. The living ex-presidents not present were Frederick Stearns, 1866, Detroit; A. K. Finlay, 1891, New Orleans, and Joseph E. Morrison, 1896, Montreal.

The addresses of the other speakers are published in full in this JOURNAL. They were: "The Advances in Pharmaceutical Manufactures During the Past Fifty Years," by William Jay Schieffelin; "Our Centennial," by John Uri Lloyd; "The Father of American Pharmacy, William Procter, Jr.," by Albert E. Ebert; "The Status and Landmarks of American Pharmacy, and the Development of Pharmacy During Fifty Years," by Joseph L. Lemberger; "An Ode to the Founders of the American Pharmaceutical Association," by George M. Beringer.

On motion of W. Jay Schieffelin the following resolution was adopted:

*"Resolved,* That the secretary be requested to express to Dr. Frederick Hoffmann the sincere regret that the American Pharmaceutical Association feels at his absence from the fiftieth anniversary meeting, and express to him its earnest hope that his health may be speedily restored, and its hearty thanks for the valuable paper he contributed."

At the conclusion of the exercises S. A. D. Sheppard moved that the thanks of the Association be extended to the trustees and officers of the Philadelphia College of Pharmacy for the courtesies extended the organization in inviting it to meet on its fiftieth anniversary, as it had in the days of its foundation, within the walls of this College, which motion was unanimously carried.

The President of the College, Howard B. French, then invited those present to go through the various parts of the building.

#### FIFTIETH ANNIVERSARY BANQUET.

A banquet, in commemoration of the fiftieth anniversary of the founding of the Association, was held at Horticultural Hall, on Thursday evening, September 11th. An excellent musical program was rendered by Beale's orchestra and a mandolin sextette, and toasts were responded to as follows, Prof. Joseph P. Remington acting as toastmaster. An invocation was offered by Rev. Cassius M. Roberts, Philadelphia. Hon. Charles Emory Smith's toast to "The President of the United States," combined an eloquent tribute to the memory of President McKinley, a few words of praise for the present incumbent, and a feeling reference to ex-President Grover Cleveland. Prof. Henry M. Whelpley, speaking for "The American Pharmaceutical Association, Past, Present and Future," said that no one in this country has risen to distinction without the co-operation of the Association. He said that we have spent fifty years in laying the foundation of the work of the future, and that the responsibility of determining the qualifications of the pharmacist will soon pass from the school to the State—from the few college teachers to the entire law-making body.

Hon. Hugh Gordon Miller, of Virginia, in reply to the toast, "Our Country," paid a high tribute to the United States, and during his discourse referred especially to this city and its part in Revolutionary history.

The toast, "The Pharmacist; the Brain and Brawn of Our Organization," was responded to by Prof. Wm. C. Anderson, of Brooklyn, who said of the pharmacist that the importance of his business, the position he holds in the social and business world and his loyal citizenship entitle him to recognition as a most important factor in the welfare of the community in which he lives, the State and the nation. Quiet and unassuming though he may appear, from early morn till late at night he labors under a constant strain of both mind and body, wrestling with dispositions good, bad and indifferent; listening to the fairy tales of the traveling salesman who would relieve him of all anxiety and make him wealthy in a few months if he would only push his goods in preference to any others; hearing the sad story of the sick-room and the death



chamber; advising in one instant and cheering in another, at all times realizing that health, happiness and even life depend upon his devotion, integrity and ability; and this is what the pharmacist does for the welfare of the people.

Col. Cyrus P. Walbridge, of St. Louis, speaking of "The Wholesale Druggist, Our Friend of Substance and Good Weight," said: "Co-operation in every form of human activity is now the rule of action. Politicians may prate of the harmful effect of combination, but they may as well try to stop the tides of the sea. Shall we let the world roll on, and ignore the means of progress? Shall we not co-operate in a manner that shall elevate the common standard of our calling?"

Prof. C. S. N. Hallberg responded to the toast, "The United States Pharmacopœia; the Bond Which Joins Pharmacy and Medicine," in which he referred to the high standard of work in the Pharmacopœia, the growing recognition of its merits by both physicians and pharmacists, and paid a tribute to the part which Philadelphia has played in the history of pharmacy in the United States.

J. H. Redsecker, of Lebanon, read an interesting poem, of which, on account of limited space, we give but the first and last verses:

"Just fifty years ago there met  
In this good town of Penn,  
A number of most wondrous wise  
And still more gifted men.  
'Twas here they met and here they laid  
Without much ostentation,  
The broad foundation whereon's built  
This great Association."

\* \* \* \* \*

"As they're come here from far and near,  
What thought, Sirs, can be greater  
That hundreds here again will greet  
Their famous Alma Mater.  
Oh, mother kind, extend your arms  
And open wide your portals,  
Give to each one a fond embrace,  
For are not some immortals?"

Brief responses were also made by the president-elect of the Association, Dr. Geo. F. Payne, and Prof. J. U. Lloyd, the latter of whom spoke of the one greater than all those mentioned by the previous speakers, viz., "The Mother."

## ENTERTAINMENT FEATURES.

The entertainment provided by the local committee of arrangements under William L. Cliffe as chairman, was a feature which perhaps as much as any other distinguished this meeting from the one held fifty years ago. In a great city like Philadelphia there is much to instruct as well as entertain, and every opportunity was afforded to the members and their friends of visiting the various points of interest. On Monday evening a reception to the members and their ladies was held at Horticultural Hall. A drive on Wednesday afternoon through Fairmount Park along the banks of the Schuylkill and Wissahickon to Chestnut Hill and return by trolley, and vice versa, was especially enjoyable, a complete itinerary of the trip having been published for the use of the visitors. On Thursday evening, while the members and their guests, some 500 in number, were enjoying themselves at the Jubilee Banquet, the ladies were entertained at the Chestnut Street Theatre, where the play "The Defender" was being presented, after which luncheon was served at the Horticultural Hall.

On Friday afternoon the Philadelphia Association of Retail Druggists acted as hosts, and those in attendance were taken on a steamboat excursion along the Delaware river. Luncheon was served on board the boat and music and dancing were features of the entertainment. On Saturday afternoon there was an excursion to Atlantic City, where entertainment was furnished by the local druggists.

## COLLEGE REUNIONS.

The opportunity afforded by the meeting of the American Pharmaceutical Association for the reunion of the alumni of the colleges was taken advantage of, notably by the alumni of the Philadelphia College of Pharmacy and the College of Pharmacy of the City of New York.

The resident graduates of the former tendered an informal supper to the visiting graduates, nearly 150 in all being present. The occasion was an especially interesting one, nearly all the classes since 1842 being represented. Wm. J. Jenks, of the Class of 1842, and Thomas S. Wiegand, of the Class of 1844, were among the earliest graduates represented.

# THE AMERICAN JOURNAL OF PHARMACY

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## THE WRITING OF A THESIS.

BY A. R. L. DOHME, PH.D.

Most ideas, as well as most words, have gradually in the course of time changed their original meaning; have, as we say, become modernized or brought up to date. As our views and knowledge of any subject become more and more extensive, we change them, and at any given time their generally interpreted and understood meaning represents the sum of all the knowledge that has been gained up to that time. Because we once thought the earth flat; lightning, the manifestation of the devil; earth, air, fire and water the four elements, is no reason why we should do so to-day, when knowledge obtained since the days in which the poor unfortunates who so believed lived has shown us that they were wrong. The subject of my paper, the word "Thesis," has in a similar way undergone somewhat of a change since the days of Martin Luther and his contemporaries. Those strenuous lights of the Middle Ages regarded a thesis as the height of their ambition, and any one who could establish a thesis and maintain it in the face of the enemy was a made man. While we have strenuous men nowadays, and we do things strenuously to a greater extent probably than they did even at the time of that immortal Henry, who defied State, Church and the Devil, to prevent him from doing just whatever his whim dictated, even to the extent of changing wives several times a month, still, when it comes to a thesis, we are only satellites of a very small magnitude as compared with the author of the Reformation, or the great reformers of Wittenberg or Geneva. The word "thesis" is derived

from the Greek *θέσις*, a proposition or statement derived in turn from the Greek verb *τιθέναι*, to put or set, meaning hence something put or set up for others to knock down if they can. While many of our theses of to-day are statements, that is about all they are, and, unfortunately, mostly such statements, that while they have been set up neatly on vellum or high-grade bond paper do not always have a good bottom and are easily knocked down. When our friend Martin Luther did set up a proposition, this, like himself, had a good broad sturdy basis, and seldom received a knockout block or was removed from its everlasting seat. The reputation of the author of these theses was at stake when it was put, and if he failed to defend it against all comers, he was no longer in demand as a corporation lawyer or probable member of the cabinet, but was relegated to the rear, among the lesser lights. This strenuous view of the thesis has been in vogue in Germany to a more or less extent ever since the day when the celebrated inkstand sped on its course against the wall of the Wartburg in the vain effort to knock out the individual who was preventing the then thesis from obtaining a firm stand on its pins, which individual, we have been led to believe by tradition, was no less than his Satanic Majesty himself. When the celebrated Woehler maintained his thesis before the philosophical faculty of the University of Heidelberg, he appeared on the scene with sword and buckler, and was prepared to defend the truth of the same before the entire faculty and any one else who happened in to question it. Even to-day it is customary in many German universities for the prospective graduate in philosophy to appear on the scene with a sword, even if he never had one in his hand before in his life, and defend with his tongue the proposition which he had laid down in the thesis, hoping presumably to call on the sword in case his tongue failed him or some one else had a better tongue. The main point to be brought out in this connection is that the proposition or thesis propounded had to be an original idea—something new. Unfortunately, most theses submitted to faculties of pharmacy nowadays do not live up to the old German ideal—they do not contain anything new. To the credit of the students be it said, however, that their theses do not contain new ideas or new facts because their teachers do not make it an essential part of their thesis; and they don't make it an essential part of their thesis because they don't take or have the time to teach the student how to get out some-

thing new. While I grant that it is no easy matter for a professor to suggest some line of work or subject that will yield something new to each of a class of 100 students, still, I believe it could be done, and I sincerely hope that it will soon be done. We all know that in the good old days of Liebig and Scheele, chemistry and pharmacy were about equally advanced; in fact, pharmacy had most probably the lead, for the only way Liebig could get some chemistry at first was in a pharmacy. But gradually the teachers of chemistry got their students to get out new facts and ideas in their theses, and gradually the interest in the work and the number of the theses grew until they ran into the thousands. From these thousands of facts of past theses the great science of chemistry has been evolved. While all this was going on in chemical colleges and schools, poor pharmacy was running along in the same grooves as of yore; and her sons, while they were also writing theses, did not have such energetic and hard-working teachers, and did not evolve but few new facts. Their theses were collaborations, mere well-written collections of what others had done, said or thought, and only here and there a few contained original investigation, original thought and new facts. We are reaping to-day the fruits that our pharmaceutical forefathers sowed, and we write to-day principally literary effusions, rhetorical efforts, containing beautifully worded and more or less beautifully written accounts of what the great men of pharmacy have done, usually spread out over as many pages as possible. One single new fact, one single new method, one single new compound, one single new idea, using only a single line, is worth more ten times, yea, a hundred times more, than all the calligraphy, rhetoric and diction you can crowd into a folio-volume. Think of the tremendous advances that pharmacy would have made during these hundred years if she had had a Liebig to set her the example of how new facts should be worked out, and, above all, that no one was worthy of a diploma until he had learned how to evolve new facts, learned how to investigate the unknown. We all know how very far Germany is ahead of all the rest of the world in chemistry to-day, but perhaps all do not know that she occupies that exalted and enviable position solely because her students, her candidates for degrees, were taught how to evolve new facts, how to delve into the unknown and lead the bright light of day into those

unknown mazes. The result is that more chemical facts have been brought to light in one week, in chemistry, in Germany, than in a year in most other countries. Independently entirely of the benefit to science and the world at large that each and every such fact entails, there is the engendered delight, enthusiasm and pleasure that follows the discovery of something new. No one who has ever discovered a new substance, method or fact can realize the innate delight which such a discovery produces in the discoverer; and with this delight there follows also the desire to discover more facts, work out more problems, benefit mankind by more discoveries. This pleasure cannot be described; it must be felt to be appreciated. If you will read the life or the correspondence of any of the great pioneers in the domain of chemical discovery, you will have engrafted into your brain, aye, into your very bone and marrow, some of this divine fire and enthusiasm, but even that bears only a slight semblance to the genuine delight felt upon seeing before you in your test-tube, beaker or flask your first-born chemical or pharmaceutical child. I can well recall my own experience in this line when, during an examination of that sweet substance, saccharin, which had been discovered not long before in the laboratory where I worked, I obtained the original substance of which it is a derivative, and which had never been seen or obtained by any mortal before. When, in addition to this, on the succeeding day—and I did not sleep much during that memorable night—I succeeded in obtaining the first anhydrid of an ortho-sulphocarbonic acid, a substance not supposed to be obtainable at the time, my cup was full to overflowing, and I would not have exchanged places with a king. I can well remember the exultant and beaming countenance of my teacher when together he and I held in our hand the beautifully crystalline rhombohedra of that anhydrid. Even though he had in his experience seen the birth of many and many a hundred substances, still the pleasure of this additional discovery was probably as great as any of the others, notably because it was so unexpected. While every one cannot be a Liebig, a Hofmann or a Remsen, still, every one can add his little mite to help develop the great science in which we are all interested. When you are going to write your thesis—and of course all of you who are students will do so—bear in mind the fact that what is worth doing is worth doing well; and the way to do a thesis well is to make it leave its impress upon the

development of pharmacy. Let it contain at least one new fact, and, if possible, several.

In writing a thesis, the first thing is to have your facts well established by experiment, the work producing the same having been mapped out for you or by you in advance. This is, of course, primarily, the principal work and value of the thesis, and for most students this work must be mapped out by their teachers. There are plenty of facts to be established and plenty of work to do, for you can take up almost any drug used to-day and find several chapters in its history concerning which we are totally in the dark. Thus, take so simple a drug as aloes. We know it contains aloin, but we do not know what aloin is, and we have no positive data as to the amount of aloin the various varieties of aloes contain, nor the difference between their respective aloins. We know it contains about 13 per cent. of resin, 10 per cent. of water and 63 per cent. of water-soluble substances, but we do not know what the latter are. We know that the resin of Barbadoes or Curacao Aloes is Aloresinotannol cinnamate, but we do not know if it is as efficient as aloin, and we should know it, for we discard it in the manufacture of aloin. Here in Aloes alone, we see at least four fruitful subjects for theses. Take Belladonna, Stramonium, Scopolia and Hyoscyamus. We know they contain several alkaloids, and in assaying them we always determine the total alkaloids they contain. A beautiful and valuable thesis would be to isolate from several samples of each their alkaloids, and determine just which are contained in each drug and their relative amounts. This can be done quite readily, and I should like to see one of my hearers undertake it. Again, take Capsicum, commonly known to students as "hot stuff;" we know little about it save that it is hot and that it contains an oleo-resin, but we know that this is not a pure substance but a mixture. A crystalline substance called Capsaicin has been obtained, and it is claimed to be the burning principle; but we don't know how much it contains, and to what extent it is contained in the different kinds of capsicum on the market. And, so on, I might mention dozens and dozens of fruitful topics for theses, and theses that would reflect credit upon their writers. In writing your thesis, it is desirable to begin by giving a careful and exhaustive résumé of all work that has previously been done upon your subject, giving names and references to the literature. In order to do this you must be familiar

with all the standard works upon pharmacy, and with the leading journals, notably the foreign ones, for but little original work is or has been found in our American pharmaceutical journals. Among such I would mention: *Jahresbericht der Pharmacie*, which gives annually all the work done in pharmacy during the preceding year; Hager's *Handbuch der Pharmaceutischen Praxis*, Husemann and Hilger's *Die Pflanzenstoffe*, Flückiger's *Pharmacognosie des Pflanzenreiches*, Arthur Meyer's *Drogenkunde*, and among the journals, AMERICAN JOURNAL OF PHARMACY, *Archiv der Pharmacie*, *Apotheker Zeitung*, *Chemiker Zeitung*, *Pharmaceutische Centralhalle*, *Pharmaceutical Journal and Transactions*, *Berichte der Deutschen Pharmaceutischen Gesellschaft*, *Proceedings of the American Pharmaceutical Association*, *Pharmaceutical Review and Archives*, *Druggists Circular*, and others. After your careful preliminary history of the work done on your subject, begin a description of your own work, and with it the figures and results you obtained, and your conclusions you have deduced therefrom. Very frequently you can get some good points from the dispensaries, and when you are at a loss what to do next, or how to get at some information you need, ask your instructor, or write to such men as Prof. J. U. Lloyd, Prof. Fred. Hoffmann or Prof. Fred. B. Power, who have large libraries and can often help you and will be glad to do so; or drop me a line, and I will gladly do what I can to assist you in your laudable effort to write a thesis that is a thesis, and that will reflect credit upon you, your illustrious Faculty and your grand old Alma Mater.

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## THE APPRENTICE OF FORMER DAYS.

A Reminiscence.

BY WILLIAM MCINTYRE.

A very interesting part of the recent meeting of the American Pharmaceutical Association was the historical pharmaceutical exhibition and the recital of methods current in the drug store of fifty years ago.

I am sure the men of that period have left an impress upon the present, and it may be permissible to present a few thoughts along lines of a later date, even if it may be somewhat personal.

I began my apprenticeship in 1859; when, in consideration of some slight attainment in Latin and chemistry, my yearly pay was to be



higher than usual, so that while before my preceptor had paid in addition to board and lodging with his family, twenty-five dollars per annum, I was to receive thirty, my lecture tickets at the Philadelphia College of Pharmacy and an increase of five dollars each year. And, as if to emphasize a satisfactory completion of the term, the good wife of my employer offered to furnish a certificate, saying to any lady I might select, "that I could polish the stair-rods, tack down the carpets and smile at the end of the job."

The store afforded ample opportunity for practical work. Gas was dear, and I was sent to bed so that I could open up early in the morning. I must admit a little deception—the student lamp was a small affair and its light easily hid. A mixture of alcohol and turpentine, known as burning fluid, was the fuel. My habit was to rewrite my notes and look up any not well understood part of the lecture.

The value of drug store laboratory experience was well illustrated by a remark made by my preceptor, after I had engaged in business on my own account. Visiting me during a recovery by distillation from an alcoholic percolate, "Why," said he, "if I had done that during all my business career I would have been a rich man." Alcohol which had been selling for about 40 cents had, owing to the war tax, been advanced to \$1.90 per gallon.

I graduated in 1863, and shall always account Professors Bridges, Thomas and Procter more than teachers—friends never to be forgotten—whose enthusiasm made up for the better facilities now afforded.

Professor Procter impressed our minds with his individuality and made the most lasting impressions; and in so far as we druggists were transformed into pharmacists, the responsibility is his.

He gave us the thought that pharmacy would eventually reach the professional stage. This was ever a pleasant day dream for which a place in our hearts was always reserved, and now when I recall the years spent in sailing this high ideal of a pharmacist's duty, a look backward causes no regrets.

Upon one occasion Procter said to me: "Young man, your physical appearance indicates too close attention to business," and suggested a change in surroundings and the probable healthful pleasure and benefit of attendance upon the meetings of the American Pharmaceutical Association. The next week found me in St. Louis

(thirty-one years ago), and I have reason to be thankful that I followed his advice. It was like the German wander year—a new world was opened to me, and the meetings are now an ever-recurring source of healthful pleasure and profit.

What obligations we owe to John M. Maisch—"er war ein guter deutscher Mann,"—and the many other willing workers who have labored for our good in the social and scientific meetings of this College! The necessity of keeping up with the valuable and valuable suggestions of an extended pharmaceutical horizon is very great, and few indeed are fortunate in being beyond the necessity of asking for information; and here has been the opportunity of meeting men of strong mind, with knowledge and experience, and by the discussions get a better understanding of many subjects and be thus able to apply with skill ideas in every-day store life.

I believe every drug store is just as the owner makes it. A model pharmacist believes in his right to succeed and will attend the meetings of his State and National Associations. He will keep really desirable and attractive goods of the sort the people want, sell them at a moderate profit, advertise, and attend to his own business and not be concerned about that of his neighbor, no matter how great a competitor he may be.

I have so far been able to maintain a drug store without soda water and ice cream, female pills and appliances with advertisements designed to deceive no one, exercise due caution in the sale of poisons and narcotics, content with a limited business, the responsible part of which was done at highest pay to fully equipped assistants and the merchandise part by intelligent help who did not attempt in other directions.

If "pro bono publico" I was expected to destroy the character of my store and convert it into an office for newspaper advertisements, express and other like business, my not doing so may have been a business mistake which I have survived.

Where are we now? is perhaps the question. The aggression of the large manufacturing pharmacists with assayed and physiologically tested drugs and serums, the increased number of proprietary and trade-marked articles and the introduction of a newer materia medica seem to give thought to what has been said by one who has had experience as a teacher in a college of pharmacy, followed by time spent in a pharmaceutical laboratory—his judgment

being that the colleges were about five years behind the manufacturer.

A look at some of the well-sanded writing of a few invoices purchased in my first years of business will remind one of many changes in the character of goods now stocked.

The drug store of early days was well described by Daniel Robins (McK. & R.) who said: "His experience was, the druggist who sold the most paint usually bought the best drugs for use in his prescription department."

Centennial year was great in that the people were made aware of what a really great nation this is, and individual responsibility was set forth in highest terms. Dr. Frederick Hoffmann improved the opportunity and agitated the proprietary medicine question and helped the druggists begin aggressive work with the public to correct the false impression of their alleged curative powers and dispel the assurance that natural death would, as it were, become impossible unless incurred by violence or failure to employ the proper nostrum. Druggists under his advice issued "Popular Health Almanacs." Publish the formula by law, was urged. A distinguished member of the American Pharmaceutical Association, Mr. Samuel Colcord, set this method at rest. Let me say, "just so long as the Donald Kennedys go scouring the hills of New England and discover plants that never grew, so long will it be impossible to look for curtailment." From the hills let us take to the swamps and see how true this is just now.

The accepted thought of to-day seems to be that secret formulas between physicians and pharmacists are particularly to be discountenanced; and as to proprietary articles, even the pharmacy laws are made so as not to curtail the right to their indefinite production.

A member of the New York Board of Trade, Drug Section, has said: "It is the business of the retail druggist to retail drugs." However I may differ from this statement, I am, nevertheless, confronted with the condition of difficulty in doing anything else. And when I see one of my friends on his bicycle, he having gathered up several pounds of absorbent cotton for a hurried quantity sale, I am sure others labor under like difficulties, and can join in the sentiment of an observer, who said: "Mister, thee needs a wheelbarrow!"

Pending the struggle between ethical pharmacy and the business

interests which require so many of the goods usually found in the drug store to be sold regardless of the profitable or unprofitable character of the sale, it does seem as if we are on the verge of a new and enlarged order of things based upon modern business methods. And with the confidence I have in the intelligence and business integrity of my fellow pharmacists, it is but natural that I lean to the side of mutual business dependency and financial co-operation, and can see many reasons why the money of the retail druggist, when fortified by the good qualities of its owner, can be thus honorably and profitably employed. And in these days when commercial grab in the disguise of commercial enterprise seems to have so large a sway, may we at least hope that pharmaceutical training will exert itself and control the future situation.

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## AFTER-THOUGHTS OF THE HISTORICAL EXHIBITION OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

BY M. I. WILBERT,

Apothecary at the German Hospital, Philadelphia.

The historical exhibition, that was held in connection with the semi-centennial anniversary of the American Pharmaceutical Association, was a most interesting object-lesson of the marvelous progress made in ethical pharmacy during the past century.

It was especially pleasing that the committee having the exhibition in charge succeeded in getting together such a large number of photographs and portraits of the pioneers and leaders in the pharmaceutical profession.

Looking back over the miscellaneous and highly interesting collection of relics and curios that were to be found in the various cases, it is particularly noticeable how intimately these curios were connected with the lifework of the men whose portraits were shown in another portion of the room. It would be difficult, indeed, to think of one portion of the exhibit without thinking of the other.

Perhaps the most valuable display, and the one that, to the writer at least, appeared to be the binding link between the relics on the one hand and the portraits on the other, was the collection of pharmaceutical literature shown by the Philadelphia College of Pharmacy.

Among this great collection of interesting material, a complete file of the AMERICAN JOURNAL OF PHARMACY was without question the most valuable, embodying as it does a very complete and reliable account of the gradual development of professional pharmacy in this country.

It was particularly appropriate that at this, the Fiftieth Annual Meeting of the American Pharmaceutical Association, a scheme was proposed to look up and perpetuate the history of pharmaceutical development. That this will ultimately become a most interesting and valuable department of the work of the Association is evidenced from the mass of material that was shown at this exhibition. It was also especially fitting that this innovation should have been instituted in Philadelphia, the home of the pioneers and leaders of ethical pharmacy, the cradle of the first school devoted to pharmaceutical education in this country, and the first meeting-place of the Association that has been and no doubt will continue to be an important factor in the growth and development of pharmacy along professional lines. In this connection a review of some of the more interesting data, connected with a number of pharmacists and teachers whose portraits were on exhibition, might not be out of place.

Among the photographs and portraits that were shown on the walls of this exhibition none recalls a more touching and pathetic story than does that of Charles Marshall, one of the founders, and the first president of the Philadelphia College of Pharmacy. Born in Philadelphia, April 27, 1747, he was at an early date associated with his father, Christopher Marshall, in the latter's drug store on Chestnut Street above Second.

The inventory of Christopher Marshall's property, on its division in 1772, among the two sons, Charles and Christopher, Jr., was one of the more interesting of the old account books displayed in the exhibition.

From accounts in the AMERICAN JOURNAL OF PHARMACY, it appears that Charles Marshall continued the business for some years by himself, and then associated with him his son, Charles Marshall, Jr. In the early years of the last century, the business, from a combination of circumstances, met with reverses, and the firm failed. This failure came when Charles Marshall had passed the zenith of his activity, so that he was apparently confronted by ruin and poverty

in the closing years of his life. It is at this stage that we meet with the pleasing story of heroism and self-sacrifice on the part of Charles Marshall's daughter Elizabeth.

This estimable maiden took hold of the shattered business and by dint of hard work and strict attention to the petty and sometimes annoying details not only reconstructed the business so as to insure a livelihood for the family, but ultimately regained for them a position of comparative independence.

Many of the men, who have been active in the development of pharmacy in this country, owed much of their early training to the watchful care of this early and eminently successful woman pharmacist. Among these was Charles Ellis, whom we will have occasion to mention later.

While the management of the business affairs appears to have been placed entirely in the hands of the daughter, the father, Charles Marshall, took an active interest in the professional development of pharmacy. Despite his advanced years he took a lively interest in the organization of the College of Apothecaries. This active interest in matters of common good no doubt accounts for the words of high admiration with which he was frequently spoken of by his contemporaries.

Near the portrait of this interesting personage was that of another equally as important. Daniel B. Smith, the third president of the Philadelphia College of Pharmacy and the first president of the American Pharmaceutical Association, was born in Philadelphia, July 14, 1792. The varied and valuable services that he accomplished for the development of pharmacy have never received adequate recognition. He was one of the original members of the College, attended the first meeting in Carpenters' Hall, February 23, 1821, and was a member of the committee appointed at that meeting to consider ways and means of a thorough organization of all apothecaries. He was the first secretary of the College and subsequently was the moving spirit in the inauguration of the AMERICAN JOURNAL OF PHARMACY, of which he was the first editor as well as chairman of the Publication Committee. He also contributed many timely and interesting articles, the first article in the first number, "Epsom Salts and Magne-ia," being from his pen.

Daniel B. Smith, after serving twenty-five years as president of the College, tiding it over the most trying period of its existence,

retired to spend his remaining days in the seclusion of his family circle. He died, March 29, 1883, in his ninety-first year. Besides being a pharmacist of more than ordinary ability and scientific training and attainments, he managed to infuse a considerable amount of his enthusiasm and knowledge into his contemporaries. Dr. Geo. B. Wood, in 1860, said of him that "he was without an equal among the apothecaries of his time, in scientific and literary attainments. It was largely due to the encouragement that he extended to the younger men that pharmacy has been able to reach its present development."

Two other portraits of men active in the early days of American pharmacy were to be found side by side—those of Wood and Bache, names that are still familiar throughout the length and breadth of the United States.

Franklin Bache, M.D., was born in Philadelphia in 1792. He was the editor of the first official U.S.P., published in Boston, in 1820. He was professor of chemistry in the Philadelphia College of Pharmacy from 1831 to 1841 and later was connected with Jefferson Medical College. His habits of accuracy and his attention to minor details enabled him to contribute much valuable material to the first edition of the United States Dispensary, which appeared in 1833. Dr. Bache died in Philadelphia, March 19, 1864. His friend and associate, Geo. B. Wood, M.D., LL.D., was professor of chemistry in the Philadelphia College of Pharmacy, from 1822 to 1831, and Professor of Materia Medica, from 1831 to 1835, when he resigned to become a member of the medical faculty of the University of Pennsylvania.

He was the originator of the United States Dispensary, which has always held a foremost place on the shelves of the pharmacist as a book of information and reference. Dr. Wood died in Philadelphia, March 30, 1879, at the advanced age of eighty-two. A contemporary, in speaking of his work in connection with Dr. Bache, said: "Their names will always occupy one of the most prominent places in the history of pharmacy."

While Philadelphia was foremost in establishing a school of Pharmacy, it was the Maryland College of Pharmacy that first considered the "theory and practice of pharmacy" worthy of a separate chair. It was particularly fitting therefore that the Maryland College of Pharmacy should send a picture of Thomas G. Mackenzie, the

first professor of pharmacy in that institution. This pioneer in theoretical instruction was in the apothecary business for nearly half a century, and occupied the chair of Pharmacy in the Maryland College from 1841 to 1847. He died in Baltimore, May 6, 1873, at the age of seventy-one.

The Philadelphia College soon recognized the importance of separate instruction in theoretical pharmacy, and appointed as its professor no less eminent a man than Wm. Procter, Jr. This noble individual, who is usually referred to as "the Father of American Pharmacy," was born in the city of Baltimore, May 3, 1817. He graduated from the Philadelphia College in 1837 and became a member of the College in 1840. The chair of "Theoretical and Practical Pharmacy" was instituted in 1846 and Mr. Procter was unanimously chosen to fill the same. He occupied the chair continuously for twenty years, and then, thinking that he had done his share of work for professional advancement, insisted on retiring. On the death of Prof. Edward Parrish, in 1872, a unanimous request of the Board of Trustees induced Professor Procter to resume his teaching, which he did, continuing to his death in 1874.

Professor Procter with Charles Ellis and Alfred B. Taylor constituted the delegation sent by the Philadelphia College of Pharmacy to the meeting in New York, in 1851, from which originated the American Pharmaceutical Association. Mr. Procter was always an active member of that Association and regularly attended its meetings. Closely associated with Professor Procter in much of his work was Charles Ellis, at one time apprentice in the store of Elizabeth Marshall and the subsequent proprietor of the same. For more than fifty years Mr. Ellis was active in the affairs of the College, nearly forty of which were in an official capacity. For fifteen years he was president of the College, succeeding Daniel B. Smith. He was a liberal contributor to the AMERICAN JOURNAL OF PHARMACY and served forty-two years on the publishing committee.

Another interesting personage of this period was Dr. Robert Bridges, the professor of chemistry in the Philadelphia College of Pharmacy from 1842 to 1879, and emeritus professor from 1879 to 1882. He was born in Philadelphia, March 5, 1806, and graduated from the University of Pennsylvania in 1828. Dr. Bridges was a true scientist, unassuming and rather retiring in his disposition. He was nevertheless appreciated and well thought of by members of



the various scientific societies as well as by his former students. Any one looking on the good-natured, pleasant features portrayed in the picture shown in the exhibition would certainly not marvel why what are now gray-haired men still refer feelingly to him as "Daddy Bridges."

Unless his features belie him, he was a man that would appeal particularly to a youth struggling to acquire an education, under difficulties such as none but the drug apprentice of half a century ago had to battle with.

The picture of Dillwyn Parrish, the fifth president of the Philadelphia College of Pharmacy, recalls the assertion made by his contemporaries that he contributed much to give the Philadelphia College a name honored and respected among the teaching institutions of the country.

Alfred B. Taylor, another well-known man, and one that was an active factor in the progress of pharmacy, was born in Philadelphia in 1824, and graduated from the Philadelphia College in 1844. He was a member of the committee sent to New York in 1851 and was made secretary of that meeting. Next year he was made treasurer of the permanent organization and served two years.

Mr. Taylor was an active member of the Philadelphia College of Pharmacy, acting as its recording and later as corresponding secretary for a period of thirty-six years. He was a member of the Pharmacopœial Revision Committees of 1860, 1870, 1880 and 1890, and in the latter two decades was the chairman of the College Committee on Revision.

Mr. Taylor's contributions to pharmaceutical literature, through the AMERICAN JOURNAL OF PHARMACY, were numerous, and he is generally recognized as having been one of the pharmaceutical masters of his time.

Perhaps no one individual permeated the exhibition as thoroughly as John Michael Maisch, who, though born in Germany (1831), was thoroughly American in his ideas and ideals.

Not the least interesting of the exhibits with which his name was connected were the collections of crude drugs from his private cabinet, an object-lesson of the care and work he devoted to properly illustrate his lectures.

A collection of active principles of plant drugs bore evidence the amount of original work that Professor Maisch devoted to the

study of this branch of *materia medica*. A review of the numerous and varied exhibits with which his name was connected will readily convince any one that he did more than any one other individual to secure for professional pharmacists of this country recognition and respect abroad.

How successful he was in gaining recognition of the very excellent and original work that he personally did, was evidenced by the many testimonials from all quarters of the civilized world that were included in this exhibition. These included honorary membership certificates from scientific societies in Australia, Mexico, England, Belgium, Germany and Switzerland; not the least among these honorary recognitions being the Hanbury gold medal for original research, which was awarded to Professor Maisch in 1893, just shortly before he died.

Another name that deserves particular attention is that of Dr. Edward R. Squibb, a life-long friend of Professor Procter. Dr. Squibb was born in Wilmington, Del., July 4, 1819, and graduated from Jefferson Medical College in 1845. He entered the navy as physician, but later devoted his time to laboratory work and the manufacture of medicinal preparations.

He was a voluminous writer, his contributions to the *AMERICAN JOURNAL OF PHARMACY* alone numbering upwards of a hundred.

Besides this there are many articles published in the proceedings of the American Pharmaceutical Association and also in the pamphlets published by his own firm called *An Ephemeris*.

The neatness, care and originality of Dr. Squibb were well exemplified in the exhibition by several interleaved copies of the U.S.P. that he had used to put down notes and impressions.

There were also in this exhibition a large assay balance and a binocular microscope which were as perfect, clean and in as good order as though fresh from the manufacturer or maker.

Dr. Squibb's mechanical ability was generally recognized, and was only equaled by the liberality with which he allowed competitors to share in the successes of his fertile brain. His death, which occurred October 25, 1900, is of such recent occurrence that all will still recall the feeling of loss it occasioned.

One other name, without which even a most cursory review of the advance in pharmacy would not be complete, is that of Chas. Rice. This unassuming, hard-working and whole-souled man was

born in Austria in 1841, and came to this country during the Civil War. He entered the navy as hospital steward, and later he became assistant to John Frey, apothecary at Bellevue Hospital, New York. After the death of Mr. Frey, Mr. Rice was made apothecary, and later chemist to the Department of Charities and Corrections.

Charles Rice was of a retiring disposition but of sterling character, as is evidenced by all who ever came in contact with him. He was active in the affairs of the New York College of Pharmacy and also the American Pharmaceutical Association. His most valuable and permanent work for the advancement of American pharmacy, however, was done as chairman of the Pharmacopœial Revision Committee.

It was he who made the U.S.P. a book that we can justly say compares favorably with any of its contemporaries. He died in Bellevue Hospital, May 3, 1901, honored and respected by all who knew him. He left behind him a record that will be difficult to equal, and one for which American pharmacists owe his memory a debt that will be difficult to repay.

If this brief and imperfect résumé of the thoughts that were awakened by the recent exhibition will induce some one more able than the writer to take up the subject and give to these pioneers and leaders even a meagre portion of the recognition that is due them, these lines will not have been penned in vain.

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## PRE-HISTORIC PHARMACY IN AMERICA.<sup>1</sup>

BY JOHN URI LLOYD.

The poet Longfellow is reputed to have been visited by an English traveler who said, "Your country, sir, is so awfully big and new one cannot see it in an age. Then, sir, there are no castles, no ruins to tell of old times."

Whether this story is fact or not, the expression voices the views of the majority of Europeans and I fear Americans as well. As one reared from childhood among pre-historic mounds and man-made relics that speak of an American antiquity that is voiceless in its

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<sup>1</sup> American Pharmaceutical Association, Philadelphia, 1902.

backward touches, I cannot but resent such groundless words. As one whose after-life was passed in connection with explorations and excavations among these mounds and relics of primitive man from which come no record concerning their creators, I cannot but offer a feeble protest. In boyhood days I wandered amid the burial places of a long-lost people. From the freshly washed gravel banks, deep in Kentucky soil, I collected shell-made pottery and utensils such as Indian tradition knew nothing about. And as I look back and ponder over such unappreciated antiquarian riches once at my command but now lost forever, I wonder how any thoughtful man can consider America as a country just opened up to them.

Grant to the so-called "Old World" all its marvelous antiquarian riches in stone and bronze, gold and precious gems, and yet we have American monuments as a heritage of the past that possess a charm as touchingly pathetic as are the tracings of dead civilizations in other lands.

To pharmacists in particular is this study of these ancient remains significant, for we find typified therein the fact that nations who lived and died and left no cry, word or page of print to tell their story, were master workmen with the mortar and pestle.

But to study these relics we must pass from well-known Eastern American antiquities, such as the Mound Builders left in profusion in all this great Central West. We must pass the shell monuments of Florida and the connected chains of mounds that stretch from the mouth of the Mississippi to near the Dominion of Canada. This great region, even as far eastward as the Atlantic shore, is thickly dotted with the remains of a form of civilization that gives no other record of itself than upbuilt mounds of mud and heaps of shell, and utensils such as very primitive people use for self-existence.

Turn from this forgotten people to the great Southwest, that land so recently carved out of the so-called wilderness which in our boyhood was defined as a part of the Great American Desert. A marvelous scene presents itself. Behold! this is not a new land. New to modern man it may be, but nevertheless a country literally dotted with villages and houses, a land rich in habitations of forgotten races. "Unexplored territory" has this been called but recently, this country that carries in itself lingering evidences of man's antiquated handiwork sufficient in themselves to astound one

who stands amid its ruins. Silent villages and abodes by the thousands are here, carved avenues in solid rock, stone-built houses standing as if deserted but recently. And yet back again are hillocks that, built in dimmer distances, show where in preceding ages buildings have crumbled into dust in this arid atmosphere that dries, and decay is unknown. A section of this land as large as a mighty European empire was once covered with lava. Through it peep the ruins of stone houses whose builders left no cry to tell of that seismic convulsion, perhaps periods of convulsion. Man dare not conjecture its location in the centuries lost to time. Here in this New World's oldness are dwellings that astound us even to-day, a single stone-built house covering five acres, with fragments of its walls yet standing, five stories high, over two hundred rooms on the ground floor.<sup>1</sup> Here are chains of dwellings cut into solid stone cliffs and perpendicular canyon sides practically inaccessible now to man. And in the desert afar stand deserted villages where to-day the explorer must carry water to drink and needs be careful, too, that his supply does not give out, for in those sunburned houses of the desert once teeming with life no drop of water is to be found. Thousands of abodes and villages in cliff and desert and valley, from Utah and Colorado in the north, reach down into Mexico and Central America, where deserted pyramids and ruins of great temples abound. Silent are one and all. Their human records are as hoary puzzles as is the Ohio mound that stands on the height near where these lines are written.

Of the ruins of the *old* world we hear much. Much that is tangible history have their people left to tell their story. But the ruins of this so-called new world, from Atlantic to Pacific, from Alaska to South America, rest in absolute pre-historic darkness. No written word, no voice, no tradition, no legend, no mythological line in stone or papyrus to say aught concerning the lives that came and went in those great tragedies played in time lost to man.

From out this fascinating southwest land, covered with its relics of pottery, baskets, stone implements, and such, come down to us pharmacists the link that binds us professionally to these silenced nations. A profusion of mortars and pestles, granite, lava and sandstone, litter their deserted habitations. Some of these mortars

<sup>1</sup> Records of the last.

are of prodigious size and show the effects of what seem to be ages of pestle toil. These were food grinders, and their owners must have been expert knights of the pestle, beyond compare. Other mortars, as for example, these exhibited herewith, are very small and needs must have been used for concocting arrow poisons and medicines. Grading up from little ones, such as those before us, the mortars of the Cliff Builder grow to a dished cavity in the adjacent mountain of lava.

The pestles are a study in themselves, varying as they do in size and shape, in accordance with the dish of the mortar bowl and the use to be made of the utensil. These, as shown by the specimens herewith presented, some of them made of the hardest lava and yet much worn by use, exhibit peculiarities that puzzle one who studies them with thoughtful care. Accept that the people who made and used them were masters of the utensils that give us our professional emblem, and we do them justice only. Indeed, we must award them an exalted position in our art, for they teach us lessons concerning the pestle's form, which with us is one common pattern, but with them varied both as to texture and model.

But I must not take your time by details that space will not permit. Possibly, if the subject is important enough to others, I may sometimes present the study of this subject in which I am now involved with the utmost charm to myself.

Be it enough to-day to bring these specimens of mortars and pestles, and say this, *our* semi-centennial is but a leaf in Time's great volume if it be contrasted with the vanished centennials of our American brethren whose mortars and pestles are before us. All that is left to speak of their celebrations and jubilee gatherings is locked in conjecture such as comes from out the painted and the dazzling desert, carved canyon cliffs, and homes smothering in dust and lava. The stony record of their acts is before us, but yet the book of their lives must needs be forever closed.

## REPORT OF COMMITTEE ON ACQUIREMENT OF THE DRUG HABIT.<sup>1</sup>

BY H. P. HYNSON, Chairman.

Viewed from a distance, the making of this report—like many a task, many a difficulty—seemed small indeed, but upon nearer approach it has, in the minds of your committeemen, become stupendous.

The duty of the committee was not well defined by the resolution creating it, nor is the specific purpose for which we were appointed, even yet, quite clearly shown.

That habits are formed for the use of certain drugs is a fact so well known to us all as to need no further proving; that such habits are injurious to the health, morals and general well-being of the habitues is quite well established. A discussion, therefore, of these two points is totally unnecessary. This positive knowledge regarding the existence and effects of the drug habit assures us that the personal knowledge of the individual pharmacist, touching other points connected with this awful curse, if fully and truthfully valued, will force upon the conscientious conclusions that will win from them a ready recognition of their responsibilities.

This personal knowledge, this individual experience, entails a responsibility and an accounting far more exacting than any that can be placed upon you by the efforts of this committee. It is folly for any one to say he knows nothing of this matter because organized investigation has not been made, or because statistics have not been furnished. The experience of one is the experience of the multitude, and no life is so singular as to have carried its owner even a little distance along the way without presenting much the same scenes that have been clearly viewed by the many. It will be becoming, therefore, while further discussing this subject, for the individual to lend the help of his experience and the force of his real knowledge.

In addition to this there are several questions which your committee thinks it may assist in answering, viz :

- (1) Is the use of habit-forming drugs unduly increasing?
- (2) What is the probable number of habitues?

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<sup>1</sup> Read at the meeting of the American Pharmaceutical Association, September, 1902.

(3) Is there danger in some of our newer drugs and popular remedies?

(4) To what comparative extent are the several drugs and preparations used by habitues?

(5) What is the responsibility of pharmacists in the matter?

(6) What can be done by this section and this association to lessen the evil?

To the first question nearly all of us from personal observation will give a decidedly affirmative answer. This opinion will be, we think, supported by the very best authority—by reports from the United States Treasury Department. Believing that all habit-forming drugs are imported into this country either in crude or manufactured form, your committee has thought that data of this kind would afford the simplest and surest means of answering the question.

Through the kindness of Col. W. A. Love, Secretary to the Board of Trade, Baltimore, and the courtesy of Chief of the Bureau of Statistics, O. P. Austin, we are able to give a very accurate and complete report of the importations of opium and coca with their derivatives for the last five years.

## IMPORTATIONS.

DATE.	QUANTITIES.			VALUES.					TOTALS.	
	Opium, Medicinal.	Opium, Smoking.	Morphia and Salts.	Opium, Medicinal.	Opium, Smoking.	Morphia and Salts.	Coca Leaves.	Cocaine and Salts.	Opium and Morphia.	Coca and Cocaine.
	Lbs.	Lbs.	Oz.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.
1898 . . .	72,287	117,298	25,791	162,652	791,379	35,659	53,752	59,660	989,690	113,412
1899 . . .	343,283	127,082	13,081	833,751	837,456	35,357	28,388	40,141	1,706,564	68,529
1900 . . .	537,004	129,336	26,208	1,137,762	938,524	75,274	591	112,375	2,151,560	112,966
1901 . . .	491,448	139,519	50,819	1,030,209	1,141,518	147,517	483	176,948	2,319,234	177,421
1902 . . .	548,674	163,442	38,002	1,262,369	1,190,493	96,559		254,704	2,549,421	254,704

It should be noticed that where there is a decrease of the derivative there is a corresponding larger increase in the crude product and *vice versa*, showing, also, the decrease in manufacture of cocaine and the increase of morphine manufactured in the United States. The increase in population in the last five years has been 10 per



cent. A careful investigation among physicians assures us that the legitimate use of cocaine has not increased, since its greater use in general surgery is offset by a more careful use in nose and throat work and in general practice. Because of its now known dangerous character it is, of late, seldom ordered in a prescription to be handled by the patient. The use of cocaine in operative surgery and the relief of pain by the advances in surgery largely tend to lessen the legitimate use of morphine. The prices of these products vary but little from what they were in 1898, so that the increase of over 400 per cent. in the imports of cocaine is very significant; while the increase of nearly 500 per cent. in the quantities and over 600 per cent. in the values of opium and morphine is simply startling.

As this report is being prepared, a despatch comes from San Francisco announcing that over \$1,000,000 worth of opium has just reached that port of entry in one cargo. If true, the receipts for the next year will be unprecedentedly foreboding.

That it might, in a measure, answer some of the other questions, your committee has thought wise to send out return postal cards to a number of pharmacists and physicians in different localities, as follows:

AMERICAN PHARMACEUTICAL ASSOCIATION.

Special Committee on the Question of the Acquirement of the Drug Habit.

DEAR SIR: As a member of the above committee I earnestly beg your prompt co-operation. Kindly fill out the blanks on the attached return-card, which you will please mail.

Should you prefer not to be known in the report, the card may be mailed without your signature; please give the matter your serious attention, however, and make your report as accurate and complete as possible.

ON THE QUESTION OF THE ACQUIREMENT OF THE DRUG HABIT.

How many persons do you know who have a drug habit?

Have you noticed a seemingly unwarranted use of sulfonal and trional?

Do you believe habits are formed for the popular headache remedies?

How many persons do you know who have a habit for the follow-

ing: Opium (gum), laudanum (including deod. tr. and McMunn's elixir), paregoric, morphine (including hypodermic use), cocaine, trional, sulfonal, headache cures?

Four hundred were sent to pharmacists in New York and Brooklyn, 250 to pharmacists and physicians in Philadelphia, 100 to pharmacists in Baltimore, 100 to physicians in Baltimore, 50 to pharmacists in towns of Pennsylvania and New Jersey, with results given in following table:

	Towns.	Philadelphia.	Baltimore.	New York.	Pharmacists.	Physicians.	Averages.
1 Percentage of those to whom cards were sent reporting . . . . .	50	36	22	21	22	16	26
2 Average number of habitues known to each person reporting . . . . .	7	3	5	5	4	6	5
3 Percentage reporting an unwarranted use of trional and sulfonal . . . . .	8	12	27	14	19	33	18
4 Percentage reporting no unwarranted use of trional and sulfonal . . . . .	92	68	53	70	50	57	66
5 Percentage not reporting on sulfonal and trional . . . . .	0	20	20	16	31	10	16
6 Percentage reporting a belief that habits are formed for headache cures . . . . .	50	24	70	42	54	90	57
7 Percentage reporting any unbelief that habits are formed for headache cures . . . . .	42	60	10	43	14	1	28
8 Percentage not reporting on headache cures . . . . .	8	16	20	15	32	1	15
9 Percentage of habitues using gum opium . . . . .	20	2	7	8	6	7	8
10 Percentage of habitues using laudanum . . . . .	32	17	15	11	20	9	17
11 Percentage of habitues using paregoric . . . . .	4	15	10	9	9	10	9
12 Percentage of habitues using morphine . . . . .	50	18	20	25	18	30	26
13 Percentage of habitues using cocaine . . . . .	35	10	11	18	6	13	15
14 Percentage of habitues using trional . . . . .	17	2	3	4	2	4	5
15 Percentage of habitues using sulfonal . . . . .	16	1	2	3	0	3	4
16 Percentage of habitues using headache cures . . . . .	7	19	28	22	30	25	21

The responses were better than is usual from such efforts which have always proven to be the most effective for securing statistics. We hereby thank and commend all those who were kind enough to respond; the attention is highly appreciated by the committee. Although several of our kind friends advised us that it was "a poor way to get such information" they did not suggest any better plan,

and while we agree with them that those who could give the most valuable information would be the last to offer it, we believe the results will prove interesting and be of some value.

From the reports made, and because "those who knew the least said the most," and supported by two commendably frank gentlemen who had been in favorable positions to know—one in the "tenderloin" of Philadelphia, the other in a "peculiar locality" of New York, and who reported habitues by the "hundred and more,"—we believe it is quite safe to estimate that at least five different unfortunates of this class are known to every pharmacist, making at least 200,000 in this country, or about three to every 1,000 of our population.

The use of cocaine by unfortunate women generally and by negroes in certain parts of the country is simply appalling. No idea of this can be had unless personally investigated. The police officers of these questionable districts tell us that the habitues are made madly wild by cocaine, which they have no difficulty at all in buying, it sometimes being peddled around from door to door, but always adulterated with acetanilid. Touching this special phase of the practice, we are allowed to quote the two correspondents to whom we have referred in full. One reports over two hundred habitues, 2 using opium, 5 using laudanum, 100 cocaine, 100 morphine, 20 trional, 5 sulfonal. He writes: "Being in a peculiar neighborhood I find the above-mentioned drugs abused to an awful extent. Very few care to better themselves if it were possible."

Another pharmacist writes interestingly as follows: "I spent a few months in a pharmacy located in what is known as the 'tenderloin district' in this city. From my personal observation I can say that the number of men and women, in the prime of life, addicted to the laudanum, paregoric, morphine and cocaine habits is appalling.

"Cocaine, of which the muriate is generally sold, is dispensed in crystals and also in solution, as ordered by the customer, and is used by the fiend by mouth and hypodermically. A considerable amount of cocaine is also disposed of in the form of catarrh snuff; the buyers of this article, being acquainted with the nature of it, buy it to get the desired effect.

"One case, in particular, that came under my notice is a young man, I should judge not over thirty years of age, whose limbs were

literally covered with marks from the hypodermic needle. Laudanum sold to fiends is, as a rule, a 50 per cent. preparation, *i.e.*, tincture of opium diluted with an equal volume of diluted alcohol and colored with caramel.

"The amount of paregoric sold in the 'tenderloin' is comparatively small."

All this in spite of a friend who writes us, "some people think a flea is an elephant; there is not one person in a thousand who has a drug habit." Three to one thousand was the exact number, with pronounced habits, committed to one of our city jails during the last two years. The comparative extent to which the several drugs are used is given in the table. It is only necessary, in this connection, to call attention to the fact that quite a percentage of pharmacists and physicians are of the opinion that habits are formed for sulfonal, trional and the popular headache remedies—an amply sufficient number to warrant a thorough investigation of this particular part of the subject, and to suggest caution in the use of these products.

It is not the opinion of this committee that narcotics are largely used in headache cures, nor do we believe seduction comes from the caffeine or the acetanilid alone, but to the combination of these, or a product of the combination. Preparations containing caffeine and potassium bromide and no acetanilid do not appear to produce the pleasantly stimulating effect that the addition of the latter gives. All this offers another subject worthy of investigation.

Besides the drugs and preparations listed, habits were reported for chloroform, ether, bromidia and several brands of cartarrh snuff. Our correspondents, in considerable number, condemn these snuffs as being extremely vicious. They have no doubt that they contain cocaine, and believe their sale should be suppressed. Fear is also expressed that the danger of continuing the use of suppositories containing opium or morphine is often overlooked. Besides the information to which we have already referred, we have consulted police officers, jail physicians and eminent specialists in nervous and mental diseases, physicians to insane asylums and sanatoriums, and they all unite in declaring the abuse of narcotic drugs to be on the increase, with results indescribably bad. Much of the insanity and nervous derangement prevalent is noticeably due to the drug habit and crime is often directly traceable to its impulses. Opium and

cocaine are much more brutalizing than is alcohol, with the additional horror of steady and certain progress and almost absolute absence of reform.

With the exception of proprietary and patent preparations containing these drugs, and the opium for smoking, these drugs are entirely in the control of the drug trade as represented by jobber, manufacturer and dispenser. The responsibility thus resting is frankly acknowledged by many honorable and manly pharmacists, greatly to their credit. Many of our correspondents—in fact, the large majority—were jealous of their reputations in this regard, and boldly declared that they were not and could not be made parties to this degradation. Pharmacy is proud of these, and pharmacy honors them. How far the responsibility of jobber and manufacturer extends is not yet settled, but when they know, as they must know, that they, too, are pandering to this most unfortunate, this man-destroying appetite, they must, indeed, have seared consciences to continue to supply this unwarranted demand without protest. Yet the greater responsibility, the responsibility for their sale, rests largely with registered pharmacists, who not only have control, but discretionary control. This discretion applies even to orders from physicians and their prescriptions. In no possible manner can a pharmacist be compelled to sell these drugs if he deems, with good reason, their use to be injurious to the party purchasing. The responsibility, then, becomes a sacred obligation, and the excuse so often made, "If I don't sell him, some one else will," is as cowardly as it is specious. The responsibility is upon us, and we must meet it or go down. If asked what can be done? we may answer, Our level best; that's all.

First, this section and this Association should direct their best efforts towards the absolute suppression of the incoming of opium for smoking. If the Chinaman cannot get along without his "dope," we can get along without him. The great increase in the quantity of this special kind of opium proves one of two things, or both: Either our exclusion laws are being violated, or the smoking of opium is largely practised by others than Chinese.

Next, this section and this Association should assist in securing State legislation upon the subject. Through the various State Associations and with the aid of medical bodies every State legislature should be induced to pass a uniform law carefully prepared by this Association.

Thirdly, by rule or order, all persons persistently trading in narcotics to be used by drug habitues should be excluded from pharmaceutical brotherhood, especially from this Association's membership, and should be ostracized by our profession as Law excludes the defaulter and Medicine disowns the abortionist.

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ON THE RECOGNITION OF SYNTHETIC CHEMICALS IN  
THE COMING EDITION OF THE UNITED STATES  
PHARMACOPŒIA.<sup>1</sup>

BY M. I. WILBERT,

Apothecary at the German Hospital, Philadelphia.

The present Pharmacopœia Revision Committee has several problems before it that will require a considerable amount of thought, ingenuity and far-sightedness to solve. Not the least among these problems is the question of how much and how to recognize the host of the so-called newer remedies. This is especially true in view of the fact that many of these new remedies conform with one section of the committee's instructions, as given by the national convention, while they are diametrically opposed to the clause relating to proprietary rights.

It will be remembered that the national convention of 1900, for revising the United States Pharmacopœia according to the general principles that were adopted for guiding the revision committee, allows the admission of "any synthetized product of definite composition which is in common use by the medical profession, the identity, purity, or strength of which can be determined." These instructions, however, also say that "No compound or mixture shall be introduced if the composition or mode of manufacture thereof be kept secret, or if it be controlled by unlimited proprietary or patent rights."

These two sentences, while carefully worded, nevertheless admit of a very wide difference of opinion in their interpretation.

In view of the pressure that will probably be brought to bear on the revision committee for recognition from various sources, it will be quite proper to inquire into the present status of this class of

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<sup>1</sup> Read at the Pennsylvania Pharmaceutical Association, June, 1902.

compounds, the conditions or causes that have made them popular, and also reflect for a moment on their real value by comparing them with some of the official drugs.

That this whole class of proprietary or patented remedies can hardly be considered as an unmixed blessing, is readily demonstrated by the fact that every pharmacy has, in the prescription department, one or more shelves that may be designated as "a graveyard for proprietary medicines." If you will just allow the contents of your own waste-stock shelves to pass before your mind's eye, you will recall many a half-filled bottle, the contents of which, at the present time, is absolutely worthless. Some of these remedies were short-lived and never very popular; others, you will remember, were, in their day, considered as permanent additions to the *materia medica*; for one reason or another they were popular for a considerable length of time, then their popularity gradually began to wane, and to-day they are but a memory.

While it is true that many of these preparations now found on the dead-stock shelves were simple mixtures put together with a variable amount of skill and ingenuity, still, a fair percentage of them were, or were supposed to be, chemical products, and were the outcome or result of a considerable amount of experimentation and skill.

Chemicals and chemical combinations are, of course, the substances that the revision committee will be called on to consider with a view of incorporating them in the text of the coming pharmacopœia. We can eliminate, then, all galenical preparations or mixtures, the composition or manufacture of which is usually kept secret, and confine our inquiry or remarks to such products of the chemical laboratory as will come clearly within the initial clause of the revision committee's instructions.

Let us reflect for a few moments on the methods that are used in launching one of these new chemical substances on the drug market. To begin with, the composition or properties of the substance itself are of much less importance than the acquirement of an energetic and efficient business manager.

Having a compound and a business manager, the next step is to introduce the new remedy to a number of prominent physicians, preferably those connected with teaching institutions or hospitals. For this purpose the service of an energetic agent is secured, whose business it is to visit the different physicians for the purpose of

making them acquainted with the wonderful possibilities of the new drug. This agent usually has a plausible tale of the great efficiency of, let us say, a methyl modification of a propyl-ethyl combination. Quoting learned professors, he is able to demonstrate how this very combination has been foreshadowed by the crude attempts of other manufacturing concerns. He also tells of how able scientists have for years been experimenting with a view of obtaining this same identical chemical, but that it was reserved for their chief chemist, who, after years of experimenting, and the expenditure of untold sums of money, had finally perfected a method of combining the necessary ingredients and producing the new compound.

The agent's tale is a plausible one, and, being liberally interspersed with quotations from eminent authorities in different lines of investigation, is usually listened to with more or less attention. Following this comes the offer to supply the physician with liberal samples for use in his practice. The average doctor being quite willing to try something new, readily acquiesces, and consents to give the new remedy a fair trial, with a view of reporting the results. The new drug being applicable in a great variety of physiological indications, is, of course, used more or less indiscriminately with most favorable results. Without giving the natural recuperative powers of the animal organism any of the credit, these results are collected and elaborated into a report of cases that is subsequently published in one of the current medical journals. Later the report is reprinted by the manufacturer, and thousands of copies are sent broadcast through the length and breadth of the land.

In addition to this system of personal solicitation for so-called "scientific experimentation for publication," the manufacturer usually occupies two or more pages of advertising space, in a dozen or more medical journals. In addition to, or in consideration of, occupying this amount of space the new remedy is given numerous readings notices in the scientific or news columns of the journal.

As an illustration of the influence or value of advertising, let us consider the case of one of the patented and trade-marked synthetics, the patent on which is about expiring. Some three years ago the manufacturers discontinued to advertise, with the result that a drug that three or four years ago was considered the most valuable addition to the materia medica is to-day almost forgotten. The decline in the popularity of this particular drug is well shown



in the statistics published by the United States Treasury Department. According to the list of Imports for Consumption, the value of the imported chemical in 1899 was \$7,616; in 1900 it was \$3,893, and in 1901 this had further decreased to \$1,125. This is further corroborated by personal experience and inquiry among a number of pharmacists, all of whom had noticed the gradual but certain disappearance of the popularity of this remedy.

Another interesting fact with this particular drug, as with many of the imported chemicals, is that the actual value, sworn to by the importers, is but a fraction of the price charged the consumer in this country. This difference, however, cannot by any means be considered as profit, as a very large amount of it is expended in the liberal advertising mentioned above.

Another point of view of the artificial demand that is created for many new chemicals by means of skilful advertising may be had by comparing the usefulness of any of the trade-marked chemicals with the official drugs and chemicals, notably acetanilid and salicylic acid. It is safe to say that there is not a single patented chemical on the market at the present time that promises to stand the test of time for applicability and usefulness so well as these two drugs; but, despite this fact, a pound of either of these chemicals may be purchased for less than we can get an ounce of a trade-marked and patented coal-tar chemical.

There is one other phase of this question that should not be overlooked, and that is the possibility of professional debasement by the monetary consideration. In speaking of the introduction of a new remedy, we referred to the manufacturer supplying the physician with samples, with a view of having the physiological action of the new compound tested in actual practice, and incidentally having a source of reference articles on which to base his future advertising. While this in itself is perhaps not above reproach, the offer that has been made by several manufacturers to compensate the physician for the time he must necessarily give to following out these experiments and writing the necessary articles, is, to say the least, offering something in the nature of a bribe.

It is probable, of course, that so far none of these offers have been seriously considered, and certainly none have been accepted; for who has ever seen a signed article in which the author admits that the time he has devoted to writing it has been paid for by the

manufacturer of the remedy he is extolling? What is true, however, is that physicians are much more willing to report their successes than their failures with new remedies. This is evidenced in the ultimate failure of hundreds of remedies, despite the fact that nothing but favorable reports on them can be found in the current medical journals.

It will, of course, be difficult to demonstrate to every one that but few, if any, of these patented chemicals have had anything but an artificial popularity; this, in turn, having been created by liberal advertising and the publication of premature or doubtful observations.

There is, however, one serious objection to the recognition of any of these patented remedies, and that is the proprietary right that is vested in the trade-marked name.

The nature and possibilities of a protection of this kind are illustrated in the reports that are being published in the German pharmaceutical journals. As is well known, the last edition of the German Pharmacopœia included a number of the newer remedies, either under their chemical titles or by some new non trade-marked name; it did, however, include the trade-marked name as a synonym. The patents on one or more of these preparations having expired, several firms began their manufacture, marketing them by their official title, and at less than half the price of the trade-marked article.

The apothecary buying this new product and dispensing it on all prescriptions that called for the chemical, irrespective of the name, soon found that he had made himself liable to all the dire consequences of transgressing the law. The practical lesson that the German pharmacist learned by his little experiment was that he could substitute the synonym for the official title, but that the official title and all it called for did not protect him in case the particular drug had been called for by the synonym.

This is, of course, but an evident question of common law, the principle of which has been repeatedly demonstrated.

The proper solution of this particular problem would appear to be that if it is considered desirable to include the trade-marked chemicals the trade-mark itself should be entirely ignored, and the substance be designated solely by its chemical title, or by some new name, or modification of the chemical title, with the latter as a

synonym. In the light of past experience it is safe to say that under no consideration should any substance be included during the lifetime of the patent, or at least during the period it is being actively advertised.

In conclusion the writer would like to say that a liberal and honest exchange of opinion on the present methods of introducing and selling new remedies may, and undoubtedly will, lead to a closer adherence to accepted codes of ethics, both by the pharmacist as well as the physician. For the latter it will be an incentive to acquire and to practice a system of rational therapeutics, learned from accepted text-books and treatises, instead of depending on the information contained in the advertising matter of manufacturing chemists. For us pharmacists, however, it will be a stimulus to the adherence to and practice of the fundamentals of our profession, as illustrated by the ideals and attainments of such men as Procter, Maisch, Squibb and Rice in our own time and country.

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## COLOGNES AND TOILET WATERS.

BY WILBUR L. SCOVILLE.

It is plainly apparent to even the most superficial observer that a considerable change has taken place in late years in the composition of commercial perfumes and toilet waters. This is due in part to improvements in the quality and variety of the volatile oils used, and to chemical investigations which have made close imitations of some of the more delicate odors possible by artificial means; but it is due even more to better methods of "fixing" the odors in the perfume, and to a decreased use of the animal fixing agents.

The secret of perfumery lies mainly in the choice of the fixing agents, *i. e.*, those bodies which intensify and hold the floral odors. The agents formerly employed were musk, civet and ambergris—all bodies of animal origin, and having a heavy and dull animal odor which is the direct antithesis of a floral fragrance. A free use of these bodies must inevitably mean a perfume which requires a label to tell what it is intended for—to say nothing of what it is. Such was the perfume of a dozen years ago.

To-day there is no evidence that the last of these (ambergris) is being used at all in the newer perfumes, and the other two are

employed very sparingly, if at all. The result is that the newer perfumes possess a fragrance and a fidelity to the flowers that they imitate which is far superior to the older perfumes.

Yet the newer perfume is quite as prominent and lasting as the old, while it is more pleasing. It contains the synthetic odors, with balsams or resinous bodies as fixatives, and employs musk and civet only in the most sparing manner in some of the more sensitive odors.

A distinction should here be made between artificial and synthetic odors. Artificial odors are composed of natural constituents of volatile oils, separated by fractional distillation or other means, and newly combined to produce the desired odor; such are artificial oils of rose, jasmine, tuberose, etc.

Synthetic odors are purely chemical products of definite chemical composition, such as vanillin, heliotropin, terpineol, synthetic oil of bitter almond, etc. The solid (or concrete) synthetic odors are all valuable as fixing agents, and are largely employed as such. Heliotropin, for instance, is one of the most powerful and persistent of fixatives, and, whenever its odor will allow, is employed for this end alone.

But it is for the purpose of drawing attention to the balsams, and particularly benzoin, as a fixing agent for colognes and toilet waters that the present paper is designed.

The practice of using musk in these still prevails widely. It is a mistake. A cologne should be refreshing and invigorating. It has a positive therapeutic value in slow fevers, after surgical operations, etc., when it possesses these qualities. To the feverish patient, weary with long lying in bed and tired of the smell of medicines, and in a room which seems stuffy, though it may not be, the application of a little muskless cologne to the face and hands is at once a bath and a change of atmosphere. Antipyretics may be more necessary in acute fevers, but they can never be so invigorating and cheering.

But musk is depressing, and its use in a cologne in even the minutest quantity will spoil the cologne for such uses. The first effects may be refreshing, but the musk lingers after the brighter odors have disappeared, and a sick patient is pretty sure to feel its effects. Persons in vigorous health will not notice the depressing effects of musk; but when lassitude prevails, these are very unpleasant.

Moreover, it is not a necessity in these toilet accessories, either as a blending or as a fixing agent. Its place is better supplied by benzoin for both purposes.

Only the best variety of benzoin—that known as Siam or vanilla benzoin—is suitable for this use. It costs five or six times as much as the Sumatra or marble benzoin, but the latter has a pungent and coarse quality, and lacks fragrance. The best Siam benzoin is less expensive than musk. It is best employed in tincture made of the strength and by the method of the Pharmacopœia.

#### FORMULAS.

There is so much difference in individual tastes and in the demands of cost that it is not to be expected that any single formula for a class of odors will be accepted as ideal, or any set of formulas regarded as complete.

There is no law in perfumery, but a few general considerations may be made regarding formulas for toilet waters, which will apply in most cases, if not rigidly interpreted.

Every toilet water, like a handkerchief perfume, should have a distinctive odor or quality. This is best secured by means of a few ingredients, carefully selected and of the best quality. A formula which contains a dozen or so of ingredients usually means either that the author employed poor oils and sought to cover the bad qualities of each by a liberal variety of qualifying oils, or that he made mistakes in his first selection for a desired blend and sought to correct them in the same way. The simplest formulas are usually the best, so long as they contain the essentials. But they emphatically demand good materials.

This does not mean that one must pay the highest prices and secure the fanciest brands invariably, but only that a good quality, which can be secured only at a suitable price, is the cheapest in the end.

The quality of the oils is of more consequence than the quality of the alcohol. A lot of nonsense has been written about the necessity of extreme care in the selection of alcohol for perfumes, such as certain kinds requiring alcohol made from grapes, and others demanding extreme purification, etc. A reasonable attention to a good quality of alcohol, even at a slight increase in cost, will always pay, but other things being equal, a good quality of oils in a poor quality

of alcohol will give you better satisfaction than the opposite combination. The unsophisticated public is not composed of exacting connoisseurs, and it does not appreciate extreme care or expense in either particular. A good grade of pharmaceutical alcohol, reasonably free from heavy and lingering foreign odors, will answer practically all the requirements.

Distillation of colognes and toilet waters, so often directed, is another delusion and a snare. It is true that heat will hasten the blending of the oils and the ripening of the perfume, but it will be far better and easier secured by a gentle digestion than by distillation. In fact, distillation of these is more likely to work harm than good.

The problem of catering to the demand for cheap colognes and perfumes calls for a finer discrimination. The demand usually springs from an uncultivated taste, and may mean that the most vigorous odors are desired, such as sandal-wood, rose-geranium, verbenä, etc.

These may be employed in place of the softer lavender, rose and neroli oils, or a really nice but cheaper odor may be secured by reducing the oil and alcohol strength. Since alcohol is by far the greatest factor in the expense of toilet-waters, a reduction in alcoholic strength means a proportionate reduction in cost. Moreover, odors develop more quickly and stand out more prominently in hydroalcoholic than in alcoholic media, so the reduction of the oils in any of the following formulas to one-half the quantities directed and the use of diluted alcohol as a solvent, with corresponding reductions in the benzoin, will produce odors which appear at first quite as strong as the originals, but whose permanence is lessened.

Perhaps the chief value of the following formulas may lie in the fact that they are here made public for the first time, yet it is hoped that some may find one or more of them of real value. The samples which are submitted will show what may be expected from them by the use of regular commercial grades of materials.

#### COLOGNE.

This resembles closely the popular "Farina" colognes usually sold in sealed packages:

Oil of bergamot	3 iss
Oil of lemon	3 vj

Oil of neroli	℥ iv
Oil of orange	℥ ij
Oil of rosemary	℥ ij
Tincture of benzoin	℥ ij
Orange-flower water	℥ xij
Alcohol to make 1 gallon.	
This costs \$3.40 per gallon (July prices).	

The predominating odor is that of orange flowers. Other odors may be substituted for this if desired, the rest of the formula remaining as it is. For instance, a

#### A LILAC WATER OR LILAC COLOGNE

is made by substituting terpineol for the oil of neroli, as follows:

Oil of bergamot	℥ iss
Oil of lemon	℥ vj
Terpineol	℥ iv
Oil of orange	℥ ij
Oil of rosemary	℥ ij
Tincture of benzoin	℥ ij
Water	℥ xij
Alcohol to make 1 gallon.	
Cost, \$2.90 per gallon.	

Not an ideal lilac water, but it is suggestive. Or an

#### ANTISEPTIC COLOGNE,

having some of the fragrance of pine woods, and particularly adapted for spraying a room, may be made with a slight variation, as follows:

Oil of bergamot	℥ vj
Oil of orange	℥ j
Oil of rosemary	℥ j
Eucalyptol	℥ ij
Bornyl acetate	℥ ss
Tincture of benzoin	℥ j
Alcohol	Ovss
Water	Oiiss
Cost, \$2.05 per gallon.	

Bornyl acetate is the odorous principle of oil of pine. It is about twenty times as strong as the oil, is much more soluble, and has a delightful fragrance.

The substitution of eucalyptol for oil of lemon increases the antiseptic qualities of this cologne as well as develops the characteristic

pinewoods odor in an improved degree. If a

#### HEADACHE COLOGNE

is desired, the addition of menthol and camphor to the first formula is all that is needed :

Menthol	℥iv
Camphor	℥j
Cologne (first formula)	Cong 1
Cost \$3.80 per gallon,	

Some may prefer a larger proportion of menthol ; but don't overlook the fact that too much will irritate the eyes unduly when it is applied to the face and head.

#### LAVENDER WATER.

This article is not as popular as it deserves to be, owing perhaps to variations in lavender oils. No oil is more variable than this, it being listed all the way from 50 cents to \$16 per pound.

The sample was made with an oil costing \$1.65 per pound. A finer oil would not need the oil of orange to soften it.

Oil of lavender	℥iv
Oil of bergamot	℥j
Oil of orange	℥ij
Oil of neroli	℥ss
Cumarin	℥ss
Tincture of benzoin	℥j
Water	Oj
Alcohol	Ovij
Cost \$3.00 per gallon.	

Many formulas direct oil of rose to soften the lavender, but neroli has a much finer effect and makes the lavender more fragrant.

#### FLORIDA WATER

is simply a spiced lavender water. Spicy odors may be added to the foregoing, or the following, which is a little less pronounced in lavender odor, may be preferred :

Oil of lavender	℥iss
Oil of bergamot	℥iss
Oil of orange	℥ss
Oil of neroli	℥ss
Oil of cassia	℥j
Oil of caraway	℥xv
Oil of spearmint	℥xv
Tincture of benzoin	℥j



Water	Oj
Alcohol	Ovij
Cost \$2.90 per gallon.	

BAY RUM.

In spite of the legion of formulas for this article which shower down upon us continually, the so-called "imported" and "distilled" articles still hold a place. While a foreign label and an ugly bottle may have some charm, yet there is a softness and depth about these that the formulas usually fail to reproduce. So the "imported" article may have a real point of excellence.

But it is surprising how well this superior softness can be secured by employing a very little benzoin. It imparts a quality, if used sparingly, that is very agreeable, and that suggests the foreign brands.

The following formula is adopted from the *Spiritus Myrciæ* of the *Pharmacopœia*. It is weaker in alcohol and contains the benzoin :

Oil of bay	℥ vj
Oil of orange	℥ ss
Oil of pimenta	℥ ss
Tincture of benzoin	℥ iv
Powdered orris root	℥ iss
Water	Oiv
Alcohol	Oiv
Cost about \$1.55 per gallon.	

The powdered orris root is employed chiefly as a clarifying agent.

The use of rum in place of a portion of the alcohol is a well-known improvement, but I have here preferred to let the formula emphasize the effect of the balsam ; so I have not qualified it by the addition of an unknown element in the shape of a variable rum. Use a little good rum in the above formula, and it will be found difficult to distinguish the product from some of the best "imported" brands.

VIOLET WATER.

Courage fails me to attempt to discuss this vague and fickle thing. It contradicts all that was said about the refreshing qualities of a toilet water and the use of musk. It aims to be as *unlike* the flower as possible, hence its diversities are legion. Violet is a delicate odor, but the public wants something vehement and colored green. Why it should be green they do not know, but if it is green they

know what is in the bottle after the label has been washed off. It is the almost numberless variety of odors that pass for "violet" that discourages comment. It would not be mentioned in this paper were it not that the widespread demand must be recognized. This paper might be considered fatally deficient were it ignored.

Violet extracts and waters may be divided into two classes: those made with ionone and those which depend upon a combination of rose, bergamot and sandal-wood for a vague suggestion of violet. The only point of agreement is in the use of sandal-wood and musk. Sandal-wood is prominent in most of the violet perfumes, and some contain quantities of musk (artificial or natural) far above what is commonly employed in perfumes. Plainly, "violet" is not adapted as a refreshing toilet accessory for persons not in vigorous health.

The combinations containing ionone may have a suggestion of the real violet odor. Ionone itself has a delicate odor, and a quality which can only be described as "thin," and it resembles the odor of violets only in part. It needs something to fill it out and give it "body" to become acceptable as a perfume. The most convenient single agent for this purpose is sandal-wood, and the more of this the perfume contains the more certain is the user that "something smells." Ionone, though thin, is very extensible. Doubling the quantity does not double its apparent power. The art of its use lies in properly developing and backing it in a mixture. So almost any of the heavier and more prominent odors can be, and probably is, used in its combinations.

The following resembles, in a general way, a number of commercial violet odors, but it will never be mistaken for a bunch of violets:

Ionone	3 ij
Oil of sandal-wood	3 jv
Oil of neroli	3 j
Oil of bitter almond	℥ viij
Oil of spearmint	℥ xv
Heliotropin	3 j
Musk (artificial preferred)	gr. ij
Tincture of civet	3 iv
Water	Oij
Alcohol	Ovj
Cost, about \$4.75 per gallon.	

In some of the popular "violets" the rose odor is very prominent, and combinations with rose are almost as common as ionone mix-

tures. In the cheaper grades rose geranium is used in place of rose, and the following is typical of this class, but the rose odor does not predominate:

Oil of sandal-wood	3 iv
Oil of bergamot	3 iv
Oil of rose geranium (Algerian)	3 ij
Oil of neroli	3 j
Oil of bitter almond	℥ xv
Musk (artificial or natural)	gr. j
Tincture of benzoin	3 iv
Powdered orris root	3 ij
Water	Oijj
Alcohol	Ov
Macerate 30 days and filter. Cost,	
about \$2.20 per gallon.	

The samples are colored with just a trace of green dye—not enough to leave a stain.

Violet, more than any other odor, needs time to develop. Ionone disappears entirely when first added to alcohol, but after a few days it begins to show its presence, and it continues to develop for some time. Most of the published formulas direct excessive quantities of ionone, and the result may be unsatisfactory, while the cost is prohibitive. Oil of orris may be used in place of ionone—using about eight times as much.

The second mixture is, in some respects, so incongruous and contradictory that it, too, needs a number of weeks to blend. Oil of rose (in smaller quantity), in place of oil of rose geranium, will make a softer and more fragrant water.

Finally, remember that all perfumes require time to blend and ripen. Six months should be allowed for blending whenever possible. An economical way of securing a constant stock of well ripened waters is to blend the oils in quantities, one to a dozen years in advance, without alcohol, and then when the cologne or toilet water is wanted, add the proper quantity of oil mixture to the alcohol and water and set in a warm place for three to six weeks. Then it will be found ready for use. (Read at the meeting of the A.Ph.A., September, 1902.)

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## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

PRECIS DE MANIPULATIONS DE PHARMACIE. Essai des médicaments  
Guides pour les travaux pratiques de pharmacie. Par le Dr. E.

Gérard, Professeur agrégé à la faculté de Médecine et de Pharmacie de Lille, Chargé du cours de Pharmacie. A. Strock et Cie. Imprimeurs-Éditeurs, Lyon et Paris.

This interesting little compendium or handbook is divided into four parts. The first is a collection of tests and assay methods for medicines of animal or vegetable origin. The second part comprises tests for galenical preparations. The third is composed of qualitative and quantitative tests for inorganic chemicals. The fourth, comprising 135 out of the total of 308 pages, is devoted to an enumeration of the characteristics of and tests for a number of the chemical substances of organic origin. In this part, in addition to the well-known organic chemicals and alkaloids, we find tests for such chemicals as glycerophosphate of lime, cacodylate of soda, and also a number of the more popular synthetic chemicals like phenacetine, antipyrine and sulfonal.

The contents and style of the book should recommend it particularly to the French student of pharmacy, and even to such of our American students as are familiar with the French language.

M. I. W.

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## BRITISH PHARMACEUTICAL CONFERENCE.

The thirty-ninth annual meeting of the British Pharmaceutical Conference was held at Dundee, Scotland, from August 11 to 14, 1902.

The following abstracts are made from the very complete reports of the papers and proceedings as published in the current numbers of British Pharmaceutical journals.

*The Address of Welcome* was made by Principal Mackay, of University College, Dundee, who said that the welcome that he had to extend to the delegates referred to the more serious and important work of the conference. Medical education was one of the most important branches of the work at University College, and the work of the Pharmaceutical Conference was one that went forward hand in hand with that of the medical profession. Because the Society and College had many points in common, the members of the former were cordially welcome to the halls of the College. It was earnestly wished that the conference would soon again return to Dundee.

The president expressed the gratitude of the conference for the kind words of welcome.

*Address by the President*, Mr. G. Claridge Druce, Hon. M. A. Oxford. This was devoted to an interesting review of the history and development of Scottish botany. After recounting the work of the early Scotch botanists he devoted considerable time to a plea for the proper recognition of the work done by George Don (1764-1814). The speaker mentioned the names of, and the work done by, a number of botanists that have contributed materially to our knowledge of the fauna and flora of Scotland. After which he enumerated a number of species peculiar to Scotland, giving some suggestions as to their probable origin. In concluding, Mr. Druce deplored the fact that field botany had lost much of its old-time interest for the apothecary, but expressed the hope that in coming years an increasing number of pharmacists would again devote some of their leisure hours to this interesting science, and by recording such facts as nature may reveal to them, do something to explore at least a small portion of that vast forest of the unknown by which we are still surrounded.

After the reading of a cablegram from Professor Remington, who sent "Hearty Greetings," and the subsequent transaction of routine business, including reports of committees,

*The Formulary Committee Report* was submitted by Mr. N. H. Martin, who said that a steady demand for the new edition of the formulary had been maintained. This would indicate that the number of prescribers who accepted the B.P.C. formulary as the standard for the preparations contained in it were on the increase.

The reading of the papers was then proceeded with, the first one being:

*Alkaloidal Stability of Certain Standard Preparations of the Pharmacopœia*.—W. A. Naylor, F.I.C., F.C.S., and C. Huxtable, demonstrate that there is a steady, though slow, depreciation in alkaloidal value of standardized galenical preparations. Of the five preparations that were assayed every month for nine months, the loss varies from 5.66 per cent. for liquid extract of ipecacuanha to 1.33 per cent. for liquid extract of nux vomica.

*Standardized Tinctures and Ipecacuanha Wine of the B.P.*—E. H. Farr, F.C.S., and R. Wright, F.C.S., give the results of a study of a number of commercial samples of tinctures and wine of ipecacu-

anha. The writers conclude that while perfect uniformity does not yet exist, the official processes for standardization have brought about a considerable improvement in the character and potency of these preparations.

*Note on Aromatic Sulphuric Acid.*—Leonhard Dobbin, Ph.G., has examined a number of specimens of aromatic sulphuric acid and found them all to contain sulphovinic acid. As would be expected, he finds that the quantity gradually increased with length of time the acid is kept. The writer also suggests that the rate of formation of sulphovonic acid depends largely on the temperature.

*Chinese Oil of Neroli.*—John C. Umney, F.C.S., and C. T. Bennett describe this oil, which has lately appeared on the English markets. According to the writers, the oil contains 4.79 per cent. of esters, linalyl acetate; 21.41 per cent. of free alcohol, as linalool; 25.17 per cent. total alcohols. The writers are of the opinion that this Chinese oil of neroli cannot replace French oil of neroli, or any of the different varieties of oil of petitgrain as imported into England; nevertheless, the oil has an agreeable and characteristic odor which may be taken advantage of in the making of perfumes and perfumed soaps.

*Olive Oil: Commercial Varieties and the Pharmacopœial Tests.*—John C. Umney, F.C.S., and C. T. Bennett think the official characters and tests for fixed oils are less perfect than they should be. They propose that the official limits for the specific gravity of olive oil should be reduced to read from 915 to 918, at 15° C., and that the Pharmacopœia give tests for solubility and acidity, and also specify the iodine number of the oil.

For detecting cottonseed and sesame oils the tests of Halpen and Trocher, respectively, are proposed.

*Note on Cannabis Indica.*—Thomas Maben, F.C.S., refers to a paper by G. F. Merson, and also records some observations on this same drug that have been made by Mr. H. C. Hamilton, who assays cannabis indica by physiological tests. Maben believes, with Hamilton, that the cannabinol of Wood, Spivey and Easterfield does not represent the active principle of the drug.

*Lecture on Cannabis Indica.*—Professor Marshall gives some interesting details of the collection and general composition of the different commercial forms of cannabis indica found on the market. (See also AM. JOUR. PHAR., 1902, p. 448.)

*The Oxidation and Determination of Uric Acid and Urates.*—J. F. Tocher, F.I.C., F.C.S., gives a process for the conversion of uric acid into urea by chromic anhydride, and the subsequent estimation of the urea with hypobromite solution.

*Aseptic Surgical Shaving Paste.*—Edmund White, B.Sc., F.I.C., gives a formula for a wax emulsion to be used instead of soap lather for shaving:

22· hard paraffine (M. pt. 55° C.), 3· suet, 2· soft soap, and 68· of water are placed in a suitable dish on a water bath, and, when melted, are beaten together until a white emulsion is formed; then shake in gradually 2· tragacanth in powder. When nearly cool add 2· glycerin and 1· oil of lavender.

In use, a small quantity is rubbed over the area to be shaved, and the razor immediately applied.

*Compressed Tablets.*—Edmund White, B.Sc., F.I.C., and R. A. Robinson, Jr., advocate the use of an excipient made by melting one part of oil of theobroma and adding three parts of starch, stir thoroughly, and when uniformly mixed allow to cool.

In use, enough of this preparation is taken to impart a somewhat granular character to the mixture of drugs desired to be made into tablets.

*Liquor Thyroidi.*—Edmund White, B.Sc., F.I.C., suggests that for every 20 grammes of the trimmed and bruised thyroid glands 15 c.c. of glycerin be added and allowed to macerate for twenty-four hours. Strongly express, and make up the desired volume by the addition of equal parts of glycerin and water.

*Tasteless Cascara Preparations.*—Edmund White, B.Sc., F.I.C., and R. A. Robinson, Jr., think the bitterness of cascara is due to anhydride or lactone and suggest that the addition of 5 c.c. of potassium hydroxide solution, or of 7 c.c. of strong solution of ammonia to 100 c.c. of liquid extract of cascara sagrada, with subsequent heating on a water bath, will effectually destroy the bitter taste of cascara without impairing its activity.

*The Education of the Pharmacist.*—Professor Marshall considers the training of pharmaceutical students under three heads: Simple apprenticeship, apprenticeship followed by coaching or cramming, and apprenticeship followed by a collegiate education.

In conclusion, Mr. Marshall said: "The collegiate training of a youth is best done, and in many cases most economically done, before he enters his apprenticeship."

This paper was vigorously discussed and elicited a considerable variance of opinions.

*Toxic Principles of the Coriariæ.*—Prof. C. R. Marshall demonstrates that the various members of the coriariæ, although widely and somewhat sparsely distributed, contain closely allied toxic ingredients.

*Some Examples of Galenical Preparations made on the Retail Scale.*—John H. Thomson calls attention to a number of preparations that may be made profitably, by the retail pharmacist, on a small scale.

*The Official Recognition of Antidiphtheria Serum.*—Thos. Maben, F.C.S., maintains that the use of this serum has passed the experimental stage, and is generally recognized by the medical profession as a remedy of sufficient importance to demand official recognition. He further recommends that the German Pharmacopœial standards and methods of official tests be adopted.

*Liquor Krameriz Concentratus, B.P.*—F. C. J. Bird demonstrates that the official concentrated solution might be improved by the addition of 5 per cent. of alcohol, or better still 10 per cent. of glycerin.

*New Apparatus for Milk Analysis.*—G. D. MacDougald, F.I.C., the Dundee public analyst, describes a new apparatus that is the outcome of repeated attempts to devise a satisfactory apparatus for gravimetric work.

*Bismuth Salts in Mixtures.*—Edmund White, B.Sc., F.I.C., points out that the efficacy of a bismuth mixture depends largely on the state of division of the contained bismuth salt. He recommends the use of a freshly precipitated preparation, and contributes the following formula for:

*Glycerinum Bismuthi Carbonatis.*—Sixty grammes of subnitrate of bismuth are dissolved in a mixture of 40 c.c. of nitric acid and 25 c.c. of water. The resulting solution is then poured into a solution containing 55 grammes of ammonium carbonate in 300 c.c. of water. Collect the precipitate on a calico filter, wash, drain and rub the moist precipitate with enough glycerin to measure 100 c.c. Each 2 c.c. of this mixture is equal to 1 gramme of bismuth subcarbonate.

*Bismuth Citrate and Liquor Bismuthi.*—Wm. Duncan believes that bismuth citrate is really a dibasic acid, having the formula  $H_2BIO-C_6H_6O_7$ , and calls it bismuthyl citric acid.



*Variations in the Occurrence of Salicin and Salinigrin in Different Willow and Poplar Barks.*—H. A. D. Jowett, D.Sc., and C. E. Potter, B.Sc., have examined a large number of willow and poplar barks and present their results in an interesting and comprehensive paper. In summing up the results of their investigations the writers say: Of the thirty-three samples of willow and poplar bark examined, salinigrin was only found in one—*Salix discolor*, Muhl. The amount of salicin contained in the bark of a willow or a poplar depends not only on the species, but also on the season of the year in which it is collected, the sex of the tree, and possibly other factors.

*Solanum Dulcamara.*—Frederick Davis found the two alkaloids, solanine and solanidine, the glucoside solanein and the bitter principle dulcamarin in fresh specimens of this plant. An examination of commercial solanine appears to indicate that it is a mixture of solanine and solanidine.

*Limits of Reliability of Volumetric Solutions.*—R. C. Cowley and J. P. Catford demonstrate that measurements by burette may vary 0.05 c.c. This would be equal to 0.50 of a solution one-tenth the strength. For this reason, they suggest that processes that require the use of two solutions differing in strength as 1 to 10, should direct that the stronger solution be weighed so as to insure greater accuracy in the ultimate results.

*Volumetric Estimation of Lead Salts.*—R. C. Cowley and J. P. Catford recommend the direct titration of precipitated lead oxalate, as being simple in operation and giving satisfactory results.

*Pharmacy Notes.*—R. Wright gives modified formulas for

(1) *Liquor Bromo Chloral Compositus B.P.C.*—35· sodium bromide, 35· chloral hydrate, 6·5 tincture of cannabis indica, 0·02 hyoscine hydrobromate, 125· syrup of orange, 30· mucilage of acacia, 60· liquid extract of liquorice and distilled water enough to make 500.

(2) *Camphorated Oil.*—Camphor in flower 125· olive oil 500· Place the camphor in a dry bottle, heat the oil to 71° C. and add to the camphor; shake frequently till solution is effected.

*Alcoholic Extracts*—Wright suggests that an attempt be made to work out a scheme for the standardization of those alcoholic extracts which admit of such treatment.

*The Volumetric Determination of Sodium Phosphate and Arsenate.*—F. R. Dudderidge and J. S. Hill suggest a process for the volu-

metric estimation of the above salts. Using sulphuric acid with methyl orange as an indicator, the process is said to give satisfactory results.

A pleasant diversion of the closing hours of the conference was the presentation to Mr. Taylor, who had served 15 years as Secretary of the B.P.C., of an address and several souvenirs as a reminiscence of the appreciation and good will of the members.

After the election of officers for the ensuing year and the transaction of some routine business, including a vote of thanks to the local committee, the principal of University College and the retiring president, the conference adjourned to meet in Bristol, England, in 1903.

M. I. WILBERT.

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### PHARMACEUTICAL MEETING.<sup>1</sup>

The first of the series of pharmaceutical meetings of the Philadelphia College of Pharmacy, for 1902-1903, was held on Tuesday, October 21, 1902. Mr. Howard B. French, the President of the College, presided.

The first speaker was Dr. A. R. L. Dohme, of Baltimore, who read an interesting paper on "The Writing of a Thesis" (see page 527).

The next paper was entitled "The Apprentice of Former Days—A Reminiscence," by William McIntyre (see page 532). In the discussion of this paper Mr. Evan T. Ellis said that the old-fashioned pharmacist was usually a man of marked personality, and quoted Professor Parrish as saying that a pharmacist was looked upon as a kind of oracle in his neighborhood, and that all kinds of questions were put to him which he was supposed to be able to answer. Professor Remington said in reference to the popular health almanac

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<sup>1</sup> The Committee on Pharmaceutical Meetings desire to state that it is proposed to make the meetings for the season of 1902-1903 as interesting and profitable as those in previous years. An effort will be made this year to limit the time for the reading of papers to twenty minutes, so that ample time will be afforded for discussion. Furthermore, at each meeting special topics for discussion will be presented, which will serve to bring out points of practical and general interest to the retail pharmacist.

The following are the members of the Committee for 1902-1903: Dr. R. V. Mattison, Prof. Joseph P. Remington, Prof. C. B. Lowe, Mr. W. L. Cliffe and Prof. Henry Kraemer.

published by Dr. Hoffmann in 1876-77, to which Mr. McIntyre alluded, that the author published it to replace the various proprietary almanacs, but that he did not realize the amount of money invested in this sort of thing by the proprietors and that his almanacs had consequently failed in their purpose—that of checking the nostrum traffic.

A paper was presented by Mr. M. I. Wilbert on "After-Thoughts on the Historical Exhibition of the American Pharmaceutical Association" (see page 536). The paper was discussed by a number present. C. H. LaWall stated that Daniel B. Smith was a very broad-minded man, and that besides having a drug store he was Professor of Moral Philosophy in Haverford College. Mr. Wilbert said that there was hardly an institution dating back to 1830 with which Daniel B. Smith was not connected. Of these he mentioned the Philadelphia Savings Fund, the Apprentices' Library, etc. Mr. Ellis referred to Prof. Joseph M. Carson as one of the eminent men of his time and one of the most fluent of the earlier lecturers in this College. Professor Remington said that the son of Charles Marshall had endorsed a note making the firm liable, and that this led to Mr. Marshall's failure, and that his daughter Elizabeth, then familiarly known as Betsy Marshall, established a drug store in the parlor of their home, at 56 Chestnut Street, and was so successful in the undertaking as to retrieve the fortune as well as the good name of her father. Mr. French indicated to Mr. Wilbert where the information which he desired in regard to the earlier presidents of the College could be obtained.

A paper on "Tri-basic Sodium Phosphate," by H. B. Eigelberner, owing to the absence of the author, was read by title and referred to the Committee on Publication.

Professor Remington exhibited specimens of two grades of gum arabic which were obtained by Dr. H. C. Wood (see this JOURNAL, 1902, p. 201) from Assouan, Egypt. The gum is collected and spread out on the floors of roofless mud buildings to dry, being occasionally raked over. He also exhibited a sample of senna collected by Dr. Wood from Assouan, which had been brought from the Soudan. Professor Remington also called attention to an improved torsion balance for prescription work; to the Hunter's Sifter, which is a combined mixer and sieve, and also to Day's Clipper Emulsifier. Mr. French said that the latter resembled the bread

mixer which was used in Germany and adopted in this country for mixing other things, including paints.

Before adjourning, a vote of thanks was tendered the speakers for the papers presented.

H. K.

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## PHILADELPHIA COLLEGE OF PHARMACY.

### MINUTES OF THE SEMI-ANNUAL MEETING.

The semi-annual meeting of the members of the Philadelphia College of Pharmacy was held in the library, on September 29th. The President, Howard B. French, was in the chair. Twenty-six members were present. The minutes of the meeting, held June 30th, were read and approved. The minutes of the meeting of the Board of Trustees, held June 3d, were read by the Registrar, W. Nelson Stem, and approved as read.

Mr. H. L. Stiles, for the Committee on Meeting of the American Pharmaceutical Association, presented a report of the Jubilee Session held at the College Hall, on September 11th. Prof. Henry Kraemer, for the delegates to the American Pharmaceutical Association, presented a report. A full report has been published in *THE AMERICAN JOURNAL OF PHARMACY*, October, pages 484-526. The report of the Nominating Committee was received and accepted. The thanks of the College were tendered Charles Lippincott & Co., 930 Arch Street, for their liberality in providing and dispensing soda-water at the College during the meeting of the Special Jubilee Session.

Mr. George M. Beringer, Chairman of the Committee on Instruction, called attention to the research work about to be inaugurated by the Carnegie Institution; and after a discussion of the subject it was referred to the President of the College with power to act.

An election for three Trustees being next in order, Messrs. E. M. Boring and E. F. Cook were appointed tellers, who, after a ballot was had, reported the election of George M. Beringer, H. L. Stiles and Joseph W. Englaud to serve as Trustees for the ensuing three years.

C. A. WEIDEMANN, M.D., *Secretary.*

# THE AMERICAN JOURNAL OF PHARMACY

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DECEMBER, 1902.

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## THE INDICES OF REFRACTION OF MIXTURES.

BY JAMES S. STEVENS.

Gladstone and Dale have shown (see Preston's *Light*) that the index of refraction varies with the density in such a manner that  $\frac{\mu - 1}{\rho} = \text{constant}$ , where  $\mu$  = the index of refraction and  $\rho$  the density. This has been applied to the determination of the refractive index of a mixture in the following manner :

Let  $v_1, \rho_1$  and  $\mu_1$  = the volume, density and refractive index of the first liquid.

$v_2, \rho_2$  and  $\mu_2$  = the corresponding terms for the second liquid.

$v, \rho$  and  $\mu$  = the corresponding terms for the mixture.

$\mu_1^1$  and  $\mu_2^1$  = the new indices of the components after the mixture has taken place.

$\rho_1^1$  and  $\rho_2^1$  = the new densities of the components after the mixture has taken place.

Since mass equals volume times density, and the mass of the mixture equals the sum of the masses of the components, we have

$$\rho v = \rho_1 v_1 + \rho_2 v_2.$$

Since volumes are inversely as densities, and since each component occupies the volume  $v$  in the mixture, we may write

$$\frac{v_1}{v} = \frac{\rho_1^1}{\rho_1} \text{ and } \frac{v_2}{v} = \frac{\rho_2^1}{\rho_2}.$$

Now, by Gladstone's law,

$$\frac{\mu_1 - 1}{\rho_1} = \frac{\mu_1^1 - 1}{\rho_1} = \frac{\mu_1^1 - 1}{\rho_1} \cdot \frac{v}{v_1}$$

and

$$\frac{\mu_2 - 1}{\rho_2} = \frac{\mu_2^1 - 1}{\rho_2} = \frac{\mu_2^1 - 1}{\rho_2} \cdot \frac{v}{v_2}$$

Since  $\mu - 1$  represents the excess of refraction due to the presence of molecules

$$(\mu - 1) = (\mu_1^1 - 1) + (\mu_2^1 - 1).$$

Substituting in this equation the values given in those above, we have

$$\mu - 1 = (\mu_1 - 1) \frac{v_1}{v} + (\mu_2 - 1) \frac{v_2}{v}$$

If, now, we know the relative volumes of each component in the mixture, and the original refractive indices of the components, we may find that of the mixture.

The object of the following experiments was to test this law for mixtures of various oils with alcohol. The work was carefully performed by Miss Marie C. Rice, a student at the University. Unless otherwise specified,  $v_1 = v_2$  or the volumes of the components were taken equal.

TABLE.

Liquid.	Refraction Index.	By Formula.
Alcohol . . . . .	1'3615	—
Oil of cloves . . . . .	1'5302	—
Mixture . . . . .	1'4475	1'4464
Spearmint . . . . .	1'4853	—
Mixture . . . . .	1'4269	1'4233
Tansy . . . . .	1'5016	—
Mixture . . . . .	1'4295	1'4315
Lavender . . . . .	1'4533	—
Mixture . . . . .	1'4120	1'4073
Mixture 1:5 . . . . .	1'3789	1'3779
Oil of cloves and alcohol 1:4 . . . . .	1'3973	1'3926

These results would indicate that the law holds within the limits of error of measurement.

An interesting result was obtained with water and alcohol. Assuming that when equal volumes of these liquids are mixed together there is a contraction of about 3 per cent. (see "Encyc. Brit.," article "Alcohol"), we would have for the volume ratio

$$\frac{50}{97} = \frac{v_1}{v}$$

Calling the index of refraction of water 1.3332 the experimental result obtained by the mixture was 1.3587. By the formula, without allowing for the contraction, 1.3474; allowing for the contraction, 1.3569, which is as close as the average results. This suggests a method by which the volume of a mixture of any liquids which contract when placed together, but do not act chemically upon each other, may be obtained.

THE UNIVERSITY OF MAINE,  
 PHYSICAL LABORATORY.

## THE THERAPEUTIC APPLICATION OF THE X-RAYS.

BY M. I. WILBERT,  
 Apothecary at the German Hospital.

The marvelous cures that are being reported in the daily press as having been accomplished by means of the X-rays would warrant the presentation of the true status of these rays as a therapeutic agent. The reports as published are rather misleading, in that they have a tendency to make people believe that treatment by means of the X-rays was not alone well established, but that in many if not all cases of pathological new growths or ulcerations this method of treatment would dispense entirely with the use of the surgeon's knife.

In this respect these reports are likely to cause a considerable amount of harm by inducing individuals to refuse to submit to a surgical operation at a time when such a procedure would involve little or no risk to life, but would, on the other hand, appear to offer some chance of bringing about a permanent cure.

The pharmacist can and should contribute his share to a proper elucidation of the facts. In matters of this kind he is often asked for

his opinion or advice by customers or friends, and if he, as he should be, is able to speak intelligently on the subject, he will probably have sufficient influence to induce the patient to submit to the advice or directions of his family physician. That the X-rays have effected cures that appear to border on the wonderful cannot be denied. But it is also true that the conditions under which these cures have been effected cannot readily be duplicated in every instance. We have here but another illustration of the fact, that while success in any field of human achievement is, as a rule, freely reported, corresponding failures also happen but are given little or no publicity, and usually find their way to our knowledge by disappointing personal experiences.

To get a better idea of the action of the X-rays it will be necessary to follow in outline the development of our knowledge of the subject.

As is well known, the announcement of the discovery of these physical phenomena was made by Wilhelm Conrad Roentgen, at Würzburg, during December, 1895, and by him named the X or unknown rays. These rays are caused by the discharge of a high tension current of electricity through a suitable vacuum tube, and may be defined as "a form of energy that will penetrate otherwise opaque bodies, and cause certain chemical substances to fluoresce, or they will affect photographic plates very much similar to ordinary actinic light." All of these properties had been observed by Roentgen before he announced his discovery, and practically the only new discovery that has been added is the fact that these rays are practically conductors of electricity, and have the additional property of dispersing negative charges on insulated surfaces, and then charging these same surfaces with a positive charge.

The fact that the X-rays had the property of penetrating otherwise opaque bodies was immediately made use of to a considerable extent, largely with a view of exploiting the possibilities of their application for scientific investigations. Shortly after the first announcement of the discovery of these rays, there appeared in the medical, as well as lay-press, accounts of peculiar secondary effects that were occasioned by a prolonged exposure to the excited vacuum tube. Chief among these was a severe dermatitis, or inflammation of the skin, simulating a very severe case of sunburn. In cases where the head and face had been exposed this was some-



times accompanied by a falling out of the hair of the head or beard. In some of the cases the inflammatory condition is said to have appeared on the side of the part that was farthest removed from the tube.

It was immediately suggested that here was a means by which disease in any portion of the body might be reached and modified. This suggestion led to extensive investigations, and it was soon found that the rays themselves had little or no effect on the growth of micro-organisms in suitable culture media. It was evident, then, that any healing properties that these rays possessed were not due to any direct bactericidal action, and must therefore be of some different nature.

The exact mode of action has even at the present time not been definitely determined; it is probably due to some electro-chemical action on the healthy cells or cell-contents, causing an active though non-infectious inflammatory condition that ultimately results in a marked improvement in the circulation and tone of the surrounding tissues.

Extensive experiments have been made in Europe, as well as in this country, and a considerable amount of reliable data has been collected as to the effects that the X-rays have on different conditions under varying circumstances.

So far, most promising and satisfactory results have been obtained in cases of superficial new growths, like the epidermoid cancers and epitheliomata. The rays have also been used, with some favorable results, in cases of carcinoma of the breast both new and recurrent. The most promising field, however, for the application of the X-rays appears to be in cases of lupus, a form of tuberculosis involving the skin. This is one of the diseases that does not readily yield to ordinary therapeutic measures, and the favorable and apparently permanent results that have been obtained by means of this new therapeutic agent are therefore particularly gratifying. Several series of experiments that have been made, and extensively quoted, appear to indicate that it is possible to modify the ordinary course of tubercular processes that have been artificially produced in guinea pigs. From these published reports we would be led to believe that here we have the promise of an active curative agent in the two scourges of the human family—carcinoma and consumption. It must be remembered, however, that a very great amount of experi-

mental work and honest scientific investigation must be done before it can be said definitely what can and what cannot be done by means of the X-rays. In the meantime we must not forget that these rays are active agents, and like all active agents for possible good, are also capable of doing harm in the hands of the inexperienced or careless.

It goes without saying that an agent that is powerful enough to effect a change in a chronic, abnormal condition that has refused to yield to other treatment, is also powerful enough to cause damage in normal structures when improperly used. In this connection it may be well to call attention to a paper published in a recent number of the *Philadelphia Medical Journal* by Dr. Codman, of Boston, in which he has collected data of upwards of 200 cases of so-called X-ray burns, and shows that a very large percentage of these cases were caused by either carelessness in the technic or by persons ignorant of the necessary precautions that should be taken.

In addition to the conditions that have been enumerated above, the X-rays have been used as a cosmetic agent to remove superfluous hair; in some cases of psoriasis, eczema and acne they have also given very favorable results. Altogether, it may be said that this mode of treatment is much more applicable in the various affections of the skin than in cases where the deeper tissues are involved, though a number of cases have been reported where enlarged glands have resolved themselves and disappeared without the use of any other therapeutic agent.

In addition to the curative action, the X-rays also have a marked analgesic or anodyne effect; this property has been noticed by many, and usually manifests itself in cases that have been exposed to the action of the X-rays for some time or repeatedly. By some, this anodyne effect of the X-rays is supposed to be purely mental; and while this may be true in some cases it does not explain why a patient is at times entirely relieved of pain for a considerable length of time after a prolonged exposure to these rays.

To sum up our present knowledge on the subject, we may say that, while a considerable amount of valuable data is available, there is no satisfactory basis on which we can estimate definitely the amount of exposure that will be required to bring about a certain curative effect. The factors entering into a computation of this

kind are so variable that, for the present at least, we have no definite or satisfactory clue or data for comparison.

What we can say definitely is, that a vacuum tube, working under favorable conditions, will penetrate a part of the human body and produce a demonstrable change in a photographic plate without any apparent change or effect in the part of the body that has been penetrated.

A longer exposure, however, appears to have a soothing or anodyne effect, even in cases where the patient appears to be suffering considerable pain.

A still longer exposure will, depending on the resistance of the individual and the length and condition of the exposure, produce a more or less decided local change in the cells of the part. This change may vary from the production of increased pigment, giving the surface a decidedly yellow or even brownish appearance through the various stages of dermatitis, or inflammation, simulating sunburn, to the production of a severe brushburn resulting in a deep slough or ulcer.

For therapeutic purposes this third stage can, by proper precautions, be kept under control, and in this way we are able to bring about changes that will result in the ultimate disappearance of some pathological conditions.

It must be remembered, however, that the number of factors that necessarily enter into the use of the X-rays as a therapeutic agent; the variability of the source of the energy, and the marked difference in the resisting powers of the individual, allow of such a wide variation in the ultimate results, that the use or suggestion of this means of treatment should be left entirely with the medical profession.

The medical journals are giving considerable space to the liberal discussion of the possibilities of this new therapeutic agent, so that there is no excuse for the modern physician not being thoroughly acquainted with all the advances as made. It will be quite safe, therefore, for the pharmacist to advise his customers and friends to abide by the decision and advice of their family physician, even in case this does not agree with the reputed advances in medicine as heralded in the daily papers.

THE COLOR-COMPOUND OF STYLOPHORUM  
DIPHYLLUM AND CHELIDONIUM MAJUS.

BY J. O. SCHLOTTERBECK.

The two plants, *Stylophorum diphyllum* and *Chelidonium majus*, Family Papaveraceæ, are so closely related botanically that a cursory glance would scarcely distinguish them. In fact, they are properly species of the same genus. A remarkable similarity in chemical constituents is also evident, since both plants contain the alkaloids chelidonine, protopine and sanguinarine, yellow coloring matter of an alkaloidal nature and chelidonic acid. The yellow coloring matter was first found in *Chelidonium* by Probst and given the descriptive name chelidoxanthin. In a paper<sup>1</sup> entitled, "Contribution to the Chemistry of *Stylophorum Diphyllum*," the statement was made that a yellow color body was separated which from analogy was believed to be identical with the chelidoxanthin of Probst. The properties of chelidoxanthin are described by Probst as follows: "Short, yellow needles, very difficultly soluble in cold water, more easily soluble in hot water, more soluble in dilute alcohol than strong alcohol, and insoluble in ether. Extremely bitter, solutions intensely yellow, one part coloring over 1,000 parts of water yellow. Acid and alkalis do not alter the color materially; concentrated sulphuric acid dissolves it easily with evolution of gas. The water solution is precipitated with tincture of nutgalls."

Chelidoxanthin was originally separated from both fresh and dried material as follows: The drug was extracted with water containing a little sulphuric acid for the purpose of removing alkaloids. The dregs were then exhausted with hot water, or until the percolate was no longer yellow. To the concentrated aqueous extract, lead-acetate solution was added until no further precipitate was formed, and then filtered. To the filtrate more lead acetate was added and the lead sulphate decomposed with hydrogen sulphide. The lead sulphide was washed with cold water until the filtrate became colorless and did not possess a bitter taste. Then the sulphide precipitate was boiled repeatedly with water until it was exhausted of yellow color. The combined filtrates were evaporated to dryness, digested with ammonia, then with ether and lastly with dilute alcohol, from which the compound crystallized in crusts.

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<sup>1</sup> Proc. A. Ph. A., 49, 251.

A very small amount of a yellow color body was obtained from *Stylophorum diphylum* by a slight modification of the above method. Qualitative tests made with this substance led the writer to believe in the presence of berberine instead of a new principle. The amount at hand, however, was too small to warrant positive statements. In order to more fully study this interesting substance, about eighty pounds of the dried root of *Stylophorum diphylum* was extracted by the ammonia-chloroform method, which consists in moistening the dry drug with ammonia water for the purpose of releasing the alkaloids from their natural combinations in the plant, drying at room-temperature, and then exhausting with chloroform. The white alkaloids are very soluble in chloroform while the yellow coloring matter is only slightly soluble.

The chloroform continued to slowly dissolve the yellow coloring matter even after all of the white alkaloids had been removed. After the chloroformic extract had been removed from the receiver, it was noticed that a thin coating of brownish-yellow color had accumulated on the wall of the vessel. A little was removed with a spatula and boiled with water, the latter becoming yellow. Dilute nitric acid almost completely precipitated the yellow coloring matter in the form of fine needles. Potassium iodide precipitated the color so completely that the supernatant liquid was absolutely without color. This reaction pointed to the existence of a salt of some base in which the acid transposed with the hydriodic acid of the potassium iodide. Gordin has shown that berberine breaks up chloroform with the formation of hydrochloric acid, the latter uniting to form the hydrochloride of berberine. The same is true with this color compound, for when the aqueous solution was treated with nitric acid and to the almost colorless filtrate silver nitrate added, a white precipitate formed which readily dissolved in ammonia water. Enough distilled water was now poured into the receiver to completely cover the coating, then heated for several hours, and the liquid filtered. The yellow solution of the hydrochloride was precipitated with dilute nitric acid, the precipitate collected on a filter and thoroughly washed with water. It was then dissolved in hot, 75 per cent. alcohol, slightly cooled and dilute sulphuric acid added in excess. Two volumes of ether were added, the whole shaken and set aside for several hours. Fine needles of the sulphate formed in considerable abundance. By purifying several times, the

color of the sulphate, as well as the hydrochloride and hydriodide, was practically the same as the corresponding salts of berberine.

The quantity of substance so obtained, though considerable, was but a small percentage of that existing in the drug. The remainder was obtained as follows: The drug remaining after extracting with chloroform was exhausted with boiling water, the percolate reduced to small volume and then treated with a large excess of strong alcohol. This removed a large amount of extraneous matter in the form of a stiff, pasty dark-colored mass. The supernatant alcoholic liquid was filtered and reduced to small volume in vacuo. Upon standing, a considerable amount of impure reddish-yellow crystals separated. A still further quantity could be thrown out by means of nitric acid or potassium iodide, but these portions were rather impure and required several recrystallizations.

This color-compound was dissolved in boiling water, filtered and portions converted into the sulphate, hydrochloride, nitrate and into the acetone compound.

The salts of this color-compound, which behave like an alkaloid, crystallize in fine needles of different shades of yellow. They are all quite insoluble in cold water. Hot water dissolves them easily, only to throw them out again in crystalline form upon cooling. Aqueous solutions are turned blood-red in color with strong chlorine water. The solutions are very bitter and are possessed of an intensely yellow color.

In color, taste, solubilities and qualitative tests this color-compound agrees with the alkaloid berberine. Ordinarily, the identification would be complete; but since Gadamer has found colored alkaloids in the Papaveraceæ, which are very similar to berberine in their behavior, it is necessary to be able to make the iridescent scales of the acetone compound to be absolutely certain that we have berberine. This was easily made in quantity from each of the four salts mentioned above and then reconverted into the hydrochloride.

The color-compound of *Stylophorum diphyllum* before purification agrees with the description of chelidoxanthin of *Chelidonium majus*. It agrees with the color-compound, which was separated from fresh plants grown for the purpose. Therefore, the writer believes that berberine should be added to the list of alkaloids found in these two plants and the name chelidoxanthin dropped. (Read at the meeting of the A.Ph.A., September, 1902).

SCHOOL OF PHARMACY, UNIVERSITY OF MICHIGAN.

## SOME NEW PREPARATIONS CONTAINING SOAP.

BY M. I. WILBERT,  
Apothecary at the German Hospital, Philadelphia.

Formic aldehyde has attracted the attention of surgeons, gynecologists and medical practitioners generally, for several years, and quite a number of preparations have been placed on the market, the medicinal properties of which are, or are supposed to be, due to this chemical substance.

Among the more recent and apparently more popular preparations of this class, is a formic aldehyde soap solution. This, or a modification containing some additional antiseptic, has been sold in Europe, especially in Germany, under various trade-names. The representative preparation, and the one that in Germany at least appears to have met with considerable success, is known as lysoform. *Lysoform*, a trademark name for a preparation, the composition of which is a secret of the manufacturer, is advertised as a safe and efficient antiseptic and disinfectant.

The *Pharmaceutische Zeitung* recently (1902, page 749) published a formula for a preparation closely resembling lysoform in its physical characteristics. This formula is as follows:

Cocoanut oil . . . . .	30 c.c.
Potassium hydrate . . . . .	8 gm.
Alcohol . . . . .	10 c.c.
Distilled water . . . . .	20 c.c.

are mixed together and subsequently heated on a waterbath, with constant stirring, until saponification has been effected. When perfectly clear, and while still warm, sufficient of a 40 per cent. formic aldehyde solution is to be added to make the finished product weigh 100 grammes.

The possible objections to this formula are, that it is rather difficult to get an oil of cocoanut that is readily and completely saponified, and in addition to this, the making of this solution requires the application of heat—something to be avoided if possible. It also entails the subsequent loss of considerable formic aldehyde, if the latter be mixed with warm soap. If the soap is allowed to get cold it will be found to dissolve but slowly in the solution of formic aldehyde.

A solution that answers the purpose as well, and is more readily made, is the following:

Castor oil . . . . .	75 c.c.
Potassium hydrate . . . . .	15 gm.
Distilled water . . . . .	25 c.c.
Alcohol . . . . .	15 c.c.
Formic aldehyde solution . . . . .	70 c.c.

Dissolve the potassium hydrate in the water. Add the alcohol to the oil contained in a suitable bottle. To this mixture gradually add the solution potassium hydrate, shaking occasionally; allow to stand until clear and then add the solution of formic aldehyde. This makes a light-yellow solution, the objectionable feature of which is the persistent odor of castor oil.

A more desirable formula, one that is readily followed and contains a higher percentage of formic aldehyde, is the following for a solution that we have designed to name sapoform.

#### SAPOFORM.

Oleic acid . . . . .	110 c.c.
Alcohol . . . . .	60 c.c.
Potassium hydrate . . . . .	20 gm.
Distilled water . . . . .	60 c.c.
Formic aldehyde solution, 40 per cent. . . . .	250 c.c.

To the oleic acid, in a suitable bottle, add the alcohol. Dissolve the potassium hydrate in the water and add gradually to the mixture of oleic acid and alcohol, occasionally shaking the mixture. Allow the mixture to stand for from twelve to twenty-four hours, then add the formic aldehyde solution.

This formula gives a clear sherry-colored liquid that appears to stand well and is freely miscible with water or alcohol.

As stated above, formaldehyde soap solutions have been used quite extensively in Germany, and are recommended as being antiseptic, disinfectant and bactericidal. They are said to be non-poisonous and non-caustic. In solution, they have been used in place of solutions of corrosive sublimate or carbolic acid. Applied locally for night-sweats of phthisis, and also in cases of excessive perspiration, especially of the feet.

German practitioners recommend 2 or 3 per cent. solutions of the preparation in distilled or soft water.

*Sapoform carbolic acid* is made by adding carbolic acid one part to sapoform two parts, mix. A preparation similar to this is being used in several of the German hospitals, and according to the published reports, with considerable success.



This is to be used the same as simple sapoform, in 2 or 3 per cent. solution in water.

The water used for diluting any of these antiseptic solutions containing soap is of considerable importance. To obtain perfectly clear solutions the water used should be perfectly pure, or at least free from any of the well-known soap precipitants, such as lime or aluminum.

*Petrox* or oxygenated petrolatum. Under this name a formula was published in THE AMERICAN JOURNAL OF PHARMACY (1901, p. 220) that appears to have given trouble to some pharmacists. The formula was as follows:

Liquid paraffin (or white mineral oil) . . . . .	100 c.c.
Oleic acid . . . . .	50 c.c.
Spirit of ammonia . . . . .	25 c.c.

Add the oleic acid to the mineral oil, shake well, add the spirit of ammonia and again shake. The only precautions necessary are to use materials that will conform to the U.S.P. tests for purity and strength. It is, of course, essential to use spirit of ammonia and not ammonia water, or spirit of hartshorn so called, as this will not give a clear solution unless the water is evaporated off, a process requiring considerable time and attention.

*Petrox iodine*, a 6 per cent. solution of iodine in simple petrox. This is readily made, providing, of course, the base has been mixed correctly. If water of ammonia has been used, a clear solution is not readily obtained. If the alkali is in excess, even slightly, the mixture will separate, after the addition of the iodine, into two layers—the upper clear layer being composed of the greater amount of the mineral oil, while the lower layer contains the ammonia soap, iodine and some of the mineral oil in solution. If the acid be largely in excess, it appears to facilitate the precipitation of the iodine.

This preparation, at best, is not a stable one, and cannot be made to be permanent to be efficient. It is readily prepared extemporaneously, the base itself being permanent and stable. This preparation, when fresh and free from precipitated ammonium iodide, is such an efficient and eminently satisfactory one that it should readily appeal to pharmacists as a point to make with physicians in their neighborhood.

Ammonia soap may also be utilized in making a preparation to sell as a *clothes cleaner* or grease chaser.

Fifty cubic centimeters oleic acid, 25 c.c. ether, 25 c.c. chloroform, 250 c.c. benzine and 50 c.c. spirit of ammonia are mixed in the order given, with occasional shaking. If a white emulsion is preferred, the same or double the amount of water of ammonia may be substituted for the spirit, the excess of alkali in this case being rather an advantage.

*Saponaceous menthol solution.*—H. Kuhl (*Phar. Zeit.*, 1902, p. 710) gives a formula for a preparation of this kind, as follows:

Menthol . . . . .	1 gm.
Chloroform . . . . .	5 c.c.
Spirit of camphor . . . . .	10 c.c.
Alcohol . . . . .	20 c.c.
Soft soap (U.S.P.) . . . . .	15 c.c.
Oil of wintergreen . . . . .	2 c.c.
Mix.	

This makes an agreeable and cooling lotion that may in many cases be recommended in place of menthol cones, or menthol pencils, for neuralgias or headaches.

## ON SOME RECENT ADVANCES IN THE FIRE-PROOFING TREATMENT OF WOOD.<sup>1</sup>

BY SAMUEL P. SADTLER.

The saturation of wood with chemical solutions has mainly two objects in view, either to prolong the life of the wood by rendering it as resistant as possible to decay, or to make it resistant to the attack of fire and to cause it when exposed to flame to carbonize as slowly as possible without, of or from itself, contributing to the increase of the flame. We will take up the second of these two lines of treatment for present discussion.

The treatment of wood with a view of making it fire-resistant is not a matter of recent years. The Bavarian chemist Fuchs in 1820 applied the newly discovered silicate of soda to the fire-proofing of wood and employed it in the rebuilding of the Munich Theatre for the treatment of both the wood work and the hangings of the theatre. Gay Lussac in 1821 suggested the salts of ammonia and

<sup>1</sup> Read before Section C of the American Association for the Advancement of Science, Pittsburg meeting, June, 1902, and reprinted from *Science*, September 12, 1902.

borax. Tungstate of soda also figured at an early date in the list of fire-proofing salts as well as the salts of zinc and the chlorides of the alkalis and calcium and magnesium. Antedating all of these, however, going back indeed to the records of ancient Greek and Rome, was alum, which has always been a favorite fire-proofing material, used both alone and in admixture with other compounds.

All of these materials can under circumstances exert a notable fire-retarding effect and have served as the basis of a variety of patented processes for the treatment of wood.

But we must not lose sight of the fact that the problem of satisfactorily impregnating wood for fire-proofing purposes is a mechanical as well as chemical one, and it will be best to look at the mechanical side of it for a few moments. The typical apparatus, until recently employed everywhere wherewith to saturate lumber with fire-proofing solutions, was a large cylinder, running from 60 inches diameter and 70 to 80 feet long to 84 inches diameter and 105 feet long, closed at one end, with a movable head at the other, swinging horizontally or lifting vertically to open or close. It was fastened when closed by a complicated system of radial bolts to the external end of the cylinder. The cylinder itself, composed of steel plates riveted together, was intended to be filled with truck loads of lumber, and when the entrance door was closed and locked the wood was subjected, after some preliminary treatment, to hydraulic pressure through the medium of the treating solution, which envelops the surface of each piece of lumber and which the pressure was intended to force into it at every point.

With cylinders of such enormous diameters and riveted plates, the pressure that can be withstood is relatively light and as a consequence the time of saturation is necessarily long.

The preliminary treatment before referred to is usually a steaming of the wood followed by application of a vacuum for the purpose of facilitating the final step of impregnation. A pressure of 150 pounds is quite as much as can be maintained as an average in such a cylinder, and to effect a complete saturation, even with soft woods 1 inch thick, requires in such a case from 36 to 40 hours. A core saturation in heavier timbers, such as 4 x 4 inches or 6 x 6 inches, is rarely if ever obtained even in soft woods, and never in the hard woods.

A radical improvement upon this method of working was effected

by Mr. Jos. L. Ferrell, of Philadelphia, in the invention of the apparatus now in use by the U. S. Fire-proof Wood Company of Philadelphia, and which was described and figured in the *Scientific American* of July 28, 1900. By the replacement of the hinged gate by a heavy gate, sliding between vertical guides against a phosphor-bronze bearing and placed in a massive gate housing near the end of the cylinder, which is of heavy cast tubing, he was able to use pressures ranging from 400 to 1,500 pounds in extreme cases. By the intervention of a hydraulic accumulator he was able to perfectly cushion the shock of the high-pressure pumps so as to prevent all bruising of the wood when under strong pressure. No preliminary steaming or vacuum is necessary, but after the receiver is full of liquid and the pressure is applied, the liquid penetrates and, in what seems an incredibly short space of time, has followed the medullary rays from end to end of the lumber and effected what is bound to be a thorough core saturation. One hundred per cent. saturation (weighed wet) is readily effected in ten minutes, and after the kiln drying the permanent gain in the weight of the wood will be found to be from 5 to 10 per cent., distributed throughout its whole cellular structure and not on the surface or in the exterior layers only.

Hard woods in large sizes up to 12 x 12 inches have been so treated, and upon being sawed through have been found to have perfect heart saturation.

With the mechanical side of the fire-proofing treatment thus perfected, let us turn again to the choice of a chemical which shall prove as fire-resistant as possible and impart this quality to the wood. Some of the qualities that such a chemical should possess may be briefly reviewed.

(1) It must not be of a hygroscopic nature, because in such case it would destroy paint and keep the surface of the wood in an undesirable moist condition. For this reason the chlorides of calcium, magnesium and zinc are excluded, although an attempt has been recently made in a German patent to produce for this purpose a basic chloride of calcium which it is claimed is free from this drawback, and is recommended for fire-proofing of wood.

(2) It must not be a volatile substance, because in such case it will gradually be liberated from the cells of the wood and show as an efflorescence, besides leaving the wood after a time weaker in its fire-resistant character. The ammonia salts, notably the sulphate

and chloride, will not stand this test at all satisfactorily. In the dry kiln, the liberation of ammoniacal gas begins already at 125° F., and the efflorescence is frequently recognizable even when the surface has been varnished if the wood has been exposed to strong sunshine for any length of time. Of course, such efflorescence speedily ruins the appearance of a varnished wood.

(3) The chemical used must not allow of fungous growth, for in such case the wood will decay more rapidly than untreated wood. Here again the ammonia salts, including the phosphate as well as sulphate, are unsatisfactory, as when the conditions of warmth and moisture are favorable the treated wood develops a fungus rapidly and deteriorates in strength.

(4) If possible, the chemical should have exactly the opposite character, viz., a distinct preservative effect, so that the life of the treated wood should exceed that of untreated wood.

(5) There should be no noxious gas liberated in the heating or carbonizing of the wood.

(6) The chemical used must not be poisonous in character, so that splinters impregnated with it, if by accident run into the flesh or wounding it, shall not endanger life or health.

(7) It should not cause the corrosion or rusting of metals which in the form of screws or bolts are passed through it.

(8) The cost must be moderate, as its practical utilization will be barred if the materials be such as to make the process an expensive one.

After a most exhaustive series of experiments, extending over several years, with a wide range of compounds, Mr. Ferrell, the inventor of the fire-proofing method just referred to, has found in sulphate of alumina a compound that appears to answer all the requirements as stated. It has the additional feature, of no slight importance in its bearing upon the fire-proofing effect, that when strongly heated it leaves an infusible and non-conducting residue to cover and protect the cellular structure throughout the wood. It absolutely prevents the propagation not only of flame throughout the wood but even of a glow because of its non-conducting and unalterable character.

Sulphate of alumina in concentrated solution is far more efficient than an alum solution; in fact, it would seem as if the alkaline sulphate of the alum simply detracted from the power of the aluminum sulphate in the matter of making wood fire-resistant.

I have before referred to the way in which sulphate or phosphate of ammonia acts to make wood fire-resistant, viz., by rapidly liberating ammonia gas, which has the effect of checking the flames on the surface of the wood. The fiercer the flame which plays against such wood the more rapid the liberation and exhaustion of the protecting vapor. There is no residual protective substance remaining in the wood, and the carbonization of the fibre proceeds apace.

On the other hand, so soon as the sulphate of alumina of the superficial layer of the wood impregnated with this chemical is decomposed by the heat of a flame, a deposit of alumina is formed, the non-conducting properties of which make it a barrier against the propagation of the carbonizing effect and protect the interior in a very notable degree. An actual experiment, one of a large number which I carried out jointly with the inventor, will illustrate this. If a piece of wood be saturated with a solution of sulphate of alumina of 30° B. strength to a depth of not more than  $\frac{3}{8}$  of an inch from the surface and the point of the inner blue cone of a strong Bunsen flame be made to impinge upon it and kept in such a position, a boring effect takes place, while an abundant separation of alumina will be observed. The average resistance of a piece of 1-inch white pine so treated to the complete boring result, with final penetration of the flame to the other side, will be over three hours. If a similar piece of 1-inch white pine be "heart-saturated" with ten times the quantity of sulphate of ammonia and the same Bunsen flame be applied under exactly similar conditions, the average resistance to complete penetration will not be over seventy minutes. These results have been obtained repeatedly and in instances the disproportion was much greater.

Some very interesting observations have been made on the physical changes which the fireproofing material undergoes on the continued application of heat. As a result of repeated measurements, it is found that the residual alumina occupies a space from two and a half to three times as great as the dried salt from which it is formed. Hence in forming it apparently expands to fill out the air spaces and intercellular spaces of the wood very fully. This results in the formation of a very compact non-conducting barrier which interposes itself to the action of the flame and protects the layers of woody tissue upon which it is formed. The protection is therefore a real and much more lasting one than that which could come

from the liberation of a gas whose action, from the nature of things, could be evanescent only.

In working on a large scale, where heavy timbers or boards in the rough are treated, the saturation with the sulphate of alumina solution is always carried out until complete "heart saturation" is attained, as the wood has to be sawed, planed, mortised and otherwise worked and cut into, and all surfaces that will be exposed later must be fire-resistant to the fullest degree.

As, irrespective of the large number of both soft and hard woods that, because of their practical value, had to be tested, the same kind of wood will differ greatly in its physical characters, according as it may be heart-wood or sap-wood, and according as it may be young wood or thoroughly matured, a vast number of saturation tests have been made in establishing the efficiency of the different methods of working and the value of different solutions. No deduction has been thought to be of value that was not based upon a large number of tests carried out under similar conditions so as to obtain an average that could be relied on. The immensity of the task may be understood when it is stated that 80,000 saturations and fire tests with complete attending records have been made of different thicknesses of nineteen different varieties of wood and forty-six chemical formulas, requiring the constant application of the inventor and his assistants and running through a period of over six years.

One remaining question, and a very important one, is what effect has the fire-proofing treatment upon the structural strength of the wood? When the older method of saturation, whereby the wood was steamed and then subjected to pressure for long periods, was the only one available, it was recognized that a compression of the cellular structure of the exterior layers of the wood took place so that the wood was distinctly weakened and the results for tensile strength and bending and breaking tests were accepted as necessarily lower than for the same wood untreated. With the superior method of impregnation now adopted, however, no such allowance is necessary, and the treated wood is in no way inferior in strength to the untreated. Professors Mason and Bliss, of the University of New York, have made a large number of physical tests upon the wood treated by the Ferrell process and have established this important fact very fully. The whole matter, however, of the fire-

resistant properties of wood treated by different processes, together with physical tests upon the same, is now under investigation by a commission appointed by the Bureau of Building Construction of the City of New York, and I have no doubt that their report when published will throw much additional light upon this most important subject.

PHILADELPHIA, July, 1902.

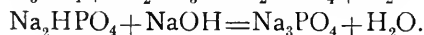
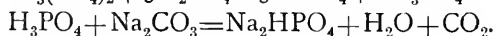
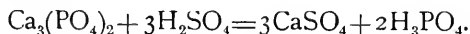
### TRI-BASIC SODIUM PHOSPHATE.

BY H. B. EIGELBERNER.

In looking through a number of chemical text and reference books, I find practically no mention of Tri-Basic Sodium Phosphate ( $\text{Na}_3\text{PO}_4 + 12\text{H}_2\text{O}$ ).

Inasmuch as the consumption in this country alone amounts to between three and five million pounds yearly, it seems to the writer that the subject is worthy of more notice than has previously been accorded it. The ingredients of this manufacture are: sulphuric acid, phosphate rock, soda ash and caustic soda.

The three stages of the operation are shown by the following reactions:



The above reactions are more or less ideal, and no account is taken of the minor reactions between small amounts of the calcium acid phosphate and the phosphates of iron and alumina, carbonates, etc.

The details of its crystallization and the appearance of the final product are very similar to the familiar di-basic sodium phosphate ( $\text{Na}_2\text{HPO}_4 + 12\text{H}_2\text{O}$ ).

Probably one-half the T.S.P. (tri-sodium phosphate) manufactured goes into the different boiler compounds, the rationale of its use being to convert the hardenable carbonates and sulphates of lime, magnesium and other incrusting minerals into unhardenable phosphates and to neutralize the acids released by decomposition.

$3(\text{CaSO}_4 + 2\text{H}_2\text{O}) + 2(\text{Na}_3\text{PO}_4 + 12\text{H}_2\text{O}) = \text{Ca}_3(\text{PO}_4)_2 + 3(\text{Na}_2\text{SO}_4 + 10\text{H}_2\text{O})$ . A corresponding reaction takes place in the carbonates—sodium carbonate in solutions and calcium phosphate precipitated.



As it renders the water perfectly clear and soft, large quantities of T.S.P. are now used in the laundries, and as a washing-powder for household use; some of the claims for it being that it saves labor, removes fruit stains, cuts grease and saves about 50 per cent. of soap.

Tri-sodium phosphate is used in creameries to cut the scum from milk cans, and in a small way to clarify water (in place of alum).

During the past year it has been used in large quantities (under different brand names) either straight or in combination with borax and other chemicals as a "casein solvent."

Tri-sodium phosphate, as found on the general market, runs between 95 and 99.5 per cent. pure. The impurities (incidental to manufacture) are, chloride, sulphate and carbonate soda. It is sometimes found adulterated with 10 to 40 per cent. glauber salt or soda ash.

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## PROGRESS IN PHARMACY.

A QUARTERLY REVIEW OF SOME OF THE MORE IMPORTANT ADVANCES IN  
PHARMACY AND MATERIA MEDICA.

BY M. I. WILBERT,  
Apothecary at the German Hospital, Philadelphia.

What will probably prove to have been an event of far-reaching importance, at least to the pharmacist who is interested in the development of the professional side of his occupation, was the meeting of "*The International Conference for the unification of potent drugs and preparations*," in Brussels, from the 15th to the 20th of September.

This congress was attended by representatives from Austria, Belgium, Bulgaria, Denmark, France, Germany, Great Britain and India, Greece, Holland, Hungary, Italy, Luxemburg, Norway, Portugal, Russia, Spain, Sweden, Switzerland and the United States of America. Many of these countries were represented by members of their respective Pharmacopœial Revision Committees, and all of the delegates were present as the official representatives of their respective governments. This latter fact gives to the deliberations and recommendations of this conference a prestige that will contribute materially to their adoption by the Pharmacopœial Revision Commissions of the various European countries.

While the recommendations finally acted on by the conference are necessarily conservative, they are advances in the right direction. A general acceptance of these recommendations by the different Pharmacopœial Revision Committees would be a deserving tribute to the work done by the conference, and also contribute materially to do away with many unnecessary and, at the present time, dangerous differences in the strength of galenical preparations.

That these recommendations will receive due consideration, especially on the continent of Europe, is evident from the tone of editorial comments in the medical and pharmaceutical journals.

In the protocol, as adopted and signed by all the delegates present, the following general principles are included :

A normal drop measure should be adopted, of which the exterior diameter of the dropping tube should be exactly 3 mm. or one that (at a temperature of 15° C. and with distilled water) will give 20 drops to 1 gramme.

Potent medicaments should not be prepared in the form of wines. Tinctures of potent drugs should be prepared at 10 per cent, and by percolation.

Fluid extracts should be prepared at 100 per cent.

The recommendation regarding tinctures of potent drugs contains a graceful tribute to the progressiveness of American pharmacy, percolation having been used for many years in the preparation of all available preparations.

The recommended strength of these potent tinctures is a subject well worthy the careful consideration of the present Pharmacopœial Revision Committee. It would not be in keeping with our general reputation for progressiveness if the United States Pharmacopœia should be the last, instead of the possible first, of the official standards to comply with the recommendations of this conference for unifying the strength of these potent preparations.

This particular question appears of still greater importance when we consider the probably very active part that this country will take in the development of the world's resources during the next decade.

Among the drugs that were discussed and acted on, the commission recognized the acceptable botanical source, and Latin titles of the following crude drugs: Aconite, Colchicum, Digitalis, Ergot, Hyoscyamus, Ipecac and Nux Vomica. Opium was adopted as the

powdered drug assayed to contain 10 per cent. of its weight of morphine. Processes for the following extracts were accepted: Belladonna, Ergot, Hyoscyamus, Nux Vomica and Opium. The first and last of these are to conform to an established standard of alkaloidal content.

Among the other galenical preparations acted on were: Fluid Extract of Ergot, Ointment of Mercury (30 per cent.), Powder of Ipecac and Opium (10 per cent. of Opium), Syrup of Ipecac (10 per cent. of Tincture), Syrup of iodide of iron (5 per cent. ferrous iodide).

The following tinctures, all to be of 10 per cent. strength, are included: Aconite, Belladonna, Cantharides, Colchicum, Digitalis, Hyoscyamus, Iodine, Ipecac, Lobelia, Nux Vomica, Opium and Strophanthus, also a proposed formula for Opium Benzoated (Camphorated U.S.P.).

In addition to these preparations, the following chemicals, or preparations containing chemical substances, were included: Wine of Antimony, Dilute Hydrocyanic Acid (2 per cent.), Solution of arsenite of potash (1 per cent. of arsenous acid), Sodium arsenate, Cocaine hydrochlorate.

One other item of interest is the negative action on the proposed recommendation of crystalline aconitine and digitaline. In this connection the ruling was that "active principles (alkaloids or glucosides) should only be admitted when they can be obtained as chemically pure crystalline products.

The annual meetings of pharmaceutical and other scientific societies have contributed materially to our store of scientific and practical knowledge. The meeting of the British Pharmaceutical Conference at Dundee, the meeting of the American Pharmaceutical Association at Philadelphia, and the *Versammlung der Deutschen Naturforscher und Aerzte*, at Carlsbad, were the representative gatherings in these various countries.

While the first two associations had contributed to them much of a practical and even commercial nature, the German Association is devoted almost exclusively to the development of scientific subjects. The society itself covers a very wide field of scientific research, and the practical work is divided among twenty-eight sections.

The proceedings of the Pharmaceutical Association, as well as the British Pharmaceutical Conference, have been reported and com-

mented on so recently that any additional remarks at this time would be superfluous. As noted above, the seventy-fourth general meeting of the German Naturalists and Physicians was held at Carlsbad, from the 21st to the 27th of September, 1902. Among the numerous papers that were presented before the Section on Pharmacy and Pharmacognosy, the following are of more particular interest to the pharmacist.

*Opium, Persian.*—P. Siedler, Berlin, suggests that in consideration of the fact that Smyrna opium is being so extensively adulterated, more attention be paid to the possible use of the better grades of Persian opium, in the making of galenical preparations.

*Horse-Chestnut, Examination and Possible Uses for.*—Dr. E. Laves, Hanover, calls attention to the food-value of horse-chestnuts and to the possibility of making this food available by removing the saponin, bitter principle and other objectionable ingredients by means of alcohol. This alcohol extract has been recommended as being possibly useful in medicine.

*The Saponin of *Lychnis Flos Cuculi*.*—Dr. P. Süß. This writer refers to the wide distribution of saponin in vegetable drugs, and then reports his method of separating the saponin from the fresh flowering herb of *Lychnis flos cuculi*. The resulting amorphous powder, amounting to 0.2 per cent. of the fresh herb, the writer calls "Lichnidin," and reserves a report of a chemical study for a future occasion.

*Quantitative Estimation of Caffeine.*—Dr. J. Katz, Leipzig, gives a modification of Beitter's method for estimating caffeine so as to make it available for roasted coffee, roasted kola nuts or Paraguay tea.

*Change in Alcoholic Tinctures.*—Dr. Richard Firbas, Vienna, calls attention to some of the possible changes that may be and are occasioned by plant ferments and analogous bodies in alcoholic tinctures containing them.

*Yohimbin.*—Dr. P. Siedler gave a résumé of the work that had been done on, and the literature of this alkaloid, obtained from a species of *Tabernæ montana*, used medicinally in aphrodisiac mixtures.

Among the novelties that were reported on at the other sections, probably the most interesting was a report from Dr. Paul Moser, before the Section on Pediatrics, on the successful use of a serum in the treatment of scarlet fever.

*Scarlet-fever serum* has, according to Dr. Moser, been used very successfully in a series of eighty cases in Vienna.

*The Pharmacaccutical Society of Japan.*—The remarkable progress made in scientific training and thought in the Far East is well illustrated in a small pamphlet giving an outline history of the rise and development of the Pharmaceutical Society of Japan. The Society was founded in October, 1878, as the Tokyo Pharmaceutical Society, with a membership of 49. In 1892 this membership had increased to 482, and the Society, that had developed from a purely local one to one of national scope, was renamed the Pharmaceutical Society of Japan. In 1901 the Society had a membership of 2,059. The journal of the Society, which originated in 1881 with a total of 35 pages, in 1901 comprised 1,392 pages, including 29 original articles that occupied 279 pages.

To make these original articles available for reference to the European and American readers and students, a very creditable series of abstracts in English accompanies each number of the journal.

*Antidecubin.*—A heavy sheet of felt, that is recommended to be used as a preventive of bedsores, is applied very much in the same way that corn and bunion plasters are—a suitable hole in the felt relieving pressure on any portion of the surface of the body, and in this way preventing laceration and subsequent breaking down of the outer skin

*Antithyreoidin*, or thyroid serum, has been commented on favorably. It is said to be the serum from sheep that, some six or eight weeks before being bled, have had their thyroid gland removed. The serum is preserved by the addition of small quantities of carbolic acid. The dose is from 0.50 gradually increased to as much as 2.00 c.c. three times a day, given in sherry, or, according to Moebius, preferably in elderberry wine, for Graves' disease, cretinism and myxœdema. (*Pharm. Centralhalle*, 1902, p. 495.)

*Bay Rum.*—The *Deutsche Apotheker Zeitung* (1902, p. 491) brings a formula that, while it does not differ materially from that given in the U.S.P., is manipulated differently and gives an agreeable and clear product.

Oil of bay . . . . .	33' c.c.
Oil of orange . . . . .	2'5 c.c.
Oil of pimenta . . . . .	2' c.c.
Alcohol . . . . .	2,000' c.c.

After dissolving the oils in the alcohol, mixed in a suitable bottle, the mixture is allowed to stand for twenty-four hours, occasionally shaking. Then add

Water . . . . . 1,500' c.c.

Calcined magnesia . . . . . 25' gm.

Shake occasionally, and allow to stand for another twenty-four hours. Filter.

A perfectly clear and sparkling product is much more readily obtained than with the U.S.P. process.

*Bismutose*.—Reinhardt (*Pharm. Zeitung*, 1902, p. 637) gives an outline of the method of preparation and the physical properties of a trade-marked and patented substitute for subnitrate of bismuth. Bismutose, from this description, appears to be an unstable mixture of bismuthyl and albumin, and is supposed to have the advantage of being absolutely innocuous even in continued large doses.

*Croton Oil*, detection of, in tincture of iodine. Durien (*Pharm. Centralhalle*, 1902, p. 447, from *Bulletin des Sciences Pharmacology*) directs that 70 grammes of water be added to 10 grammes of the suspected tincture of iodine. An excess of iron filings is then added to combine with the iodine present, forming iodide of iron. The solution is then thoroughly well shaken with a small quantity of ether, and this is later allowed to evaporate. The presence of a fatty oil is indicated by a residue, which residue may be tested for its identity by its action on the skin, odor, and brown coloration with sulphuric acid.

*Diosmal*.—Under this title Paul Runge (*Pharm. Centralhalle*, 1902, p. 465) describes the physical properties and an outline of the preparation of a petroleum ether-alcoholic extract of buchu leaves. This preparation is made by successively extracting buchu leaves with petroleum ether and strong alcohol, distilling off the solvents and ultimately mixing the residual extractives. Dose, 0.10 or more three times a day.

*Hellebore*.—A. Tschirch communicates (*Schweiz. Wochenschr.*, 1902, p. 410) a comparative study of a number of varieties of hellebore rhizomes made with the assistance of E. Neuber. This paper includes a study of the rhizomes and roots of *Helleborus viridis*, *Helleborus niger*, *Helleborus foetidus*, *Helleborus caucasicus* and *Helleborus purpurascens*. The writers also call attention to and describe a number of drugs that are sometimes mistaken for or substituted for hellebore.

*Isarol*, formerly called *ichthyodin*, a Swiss, and *Petrosulfol*, an Austrian substitute for *ichthyol*, are both said to be obtained from the same base, and to correspond to all the requirements of the Swiss Pharmacopœia for *ammonium sulfoichthyolicum*.

*Lecithol* is the trade-name for a preparation of *lecithin* made by the chemische fabrik J. D. Riedel, Berlin. *Lecithin*, the name applied to the widely distributed combination of glycerinophosphoric and fatty acids with *cholin*, has attracted quite considerable attention during the past year, and it is quite probable that the near future will see a number of preparations on the market, of which this appears to be one of the first.

**Local anesthetics:** Substances that have local anesthetic properties are always of interest. Among the chemical substances that have been experimented with in this direction are:

*Dionin*.—*Darien* (*Four. des Practiciens*, 1902, p. 131) has employed a 1 per cent. solution of *dionin* in the eye for the relief of pain. *Darien* also recommends *dionin* for the relief of pain caused by a decayed tooth.

*Acoin*.—*Darien* in the same article also says that this substance produces local anesthesia only when the epithelium is destroyed. Its action is said to be slower and more prolonged than *cocaine*. It has been employed as a local anesthetic in connection with subcutaneous injections of irritating substances, such as corrosive sublimate or iodine. Satisfactory results have also been obtained by mixtures of *cocaine* and *acoin*.

*Mesotan*, a derivative of *salicylic acid* (the *alkyloxymethylester* of *salicylic acid*), is offered as a substitute for *methyl salicylate* and true oil of *wintergreen* for external use. It is said to be free from the objectionable and persistent odor of oil of *wintergreen*, and preferable on this account. *Mesotan* is soluble in ether, alcohol, or fatty oils, and is said to be readily absorbed through the unbroken skin (*Pharm. Centralhalle.*, 1902, p. 506).

**Pancreatized Cod-Liver Oil.**—The *Chemist and Druggist* (according to the *Pharm. Zeit.*, 1902, p. 639) brings the following formula:

Cod-liver oil . . . . .	150 c.c.
Water . . . . .	50 c.c.
Extract of malt . . . . .	200 c.c.
Pancreatin (soluble) . . . . .	1 gm.
Sodium chloride . . . . .	2 gm.
Sodium bicarbonate . . . . .	2 gm.

Dissolve the pancreatin and the salts in the water and emulsify with the cod-liver oil and the extract of malt.

*Phenosalyl*.—Cambe (*Rept. de Pharm.*, 1902, No. 8) gives the following formula for this substance:

Carbolic acid, crystals . . . . .	60 gm.
Lactic acid . . . . .	5 gm.
Salicylic acid . . . . .	5 gm.
Glycerin . . . . .	20 c.c.
Borax . . . . .	8 gm.
Menthol . . . . .	1 gm.
Eucalyptol . . . . .	1 gm.
Thymol . . . . .	1 gm.

The borax is dissolved in the glycerin by aid of heat; the acids are then added to the warm solution of borax. After cooling, add the menthol, eucalyptol and thymol.

*Pyridin Tannate*.—According to Dr. Braeutigam (*Pharm. Zeit.*, 1902, p. 498) this is a valuable uric-acid solvent, and may also find application as an intestinal astringent.

The preparation, according to the same author, is made by pouring a pyridin solution into an excess of solution of tannic acid, care being taken that the temperature does not exceed 10° C. The resulting precipitate is washed with cold water until the water does not give any perceptible reaction with pyridin solution; the material is then dried at a temperature of 20° to 25° C. and preserved in the dark.

*Strychnicin*, a new strychnos alkaloid, has been reported on by G. Boorsma (*Pharm. Zeit.*, 1902, p. 608 from *Pharm. Jour.*). It occurs in the leaves, pulp, thin epidermis and rind of the fruit of *Strychnos nux vomica*.

The chemical formation and physiological action of strychnicin have not been fully studied, but it is said to be comparatively non-toxic. With concentrated sulphuric acid it gives a colorless solution that is not changed by addition of oxidizing agents like potassium bichromate or potassium permanganate.



## RECENT LITERATURE RELATING TO PHARMACY.

### THE RECORDED HISTORY OF THE MEMBERS OF THE ARGON GROUP.

This is the title of a paper by Henry P. Talbot, published in the "Technology Quarterly," for June, 1902, page 195. In this paper the writer presents a review of physical and chemical, as well as historical data.

The amount of interest that these new elements have excited is well illustrated by the closing paragraph of the paper, in which the writer states, that since the discovery of Argon, no less than 250 magazine articles have appeared relating to one or more members of this group. The following facts and figures have been culled from this interesting and comprehensive review:

*Argon.*—The circumstances that lead up to the discovery of this element may be found in the fact that Lord Rayleigh, in the course of some experiments, had noted that atmospheric nitrogen appeared to have a greater density than nitrogen obtained from chemicals, such as nitric acid, nitrous oxide or ammonium nitrite. Suggestions and explanations were numerous but unsatisfactory, and it was finally decided to determine whether or not there was an unknown heavier element in the atmospheric nitrogen.

In making these investigations Lord Rayleigh had associated with him Professor Ramsay, of University College, London. After a long series of carefully planned and executed experiments, Lord Rayleigh and Professor Ramsay, on January 31, 1895, made the announcement, at a meeting of the Royal Society in London, that they had discovered a new element in the atmosphere, to which, on account of its inert character, they had given the name Argon. The quantity of this element, present in the atmosphere, appeared to be about 1 per cent. of the contained nitrogen, or about 0.9 per cent. of the atmosphere. Assuming that the density of Argon was about 20, it would explain the greater density of atmospheric compared with chemical nitrogen. Argon has since then been found in one specimen of meteoric iron, in a variety of minerals and in the waters, or escaping gases, from a number of springs in different parts of Europe.

So far it has not been definitely demonstrated to have any chemical properties. Its physical properties, that is, its spectrum, its specific gravity and the atomicity of its molecule have been the subject

of much research and discussion. Its spectrum for instance appears to vary with the nature of the electrical energy that is used to energize the gas, and is admittedly complex and varied. This complex nature of the spectrum, as well as the accompanying variations, has been made a basis for arguments against the elementary character of Argon.

The density of Argon has been carefully determined by Ramsay, who, as the result of numerous experiments, announced 19.96 as the true value for the density of the gas; this would correspond to a molecular weight of 39.92 ( $O = 16$ ).

*Helium.*—This element was first noticed in the spectrum of the chromosphere during an eclipse in 1868, by Janssen, who noted a brilliant yellow line, which was close to but not identical with the well-known *D*-line of sodium. This he designated as the *D*<sub>3</sub>-line, and in the same year Lockyer assigned the name "Helium" to the hypothetical element, of which this line was characteristic.

While this line has been repeatedly observed since then, by projecting the image of the edge of the sun, on the slit of a spectro-scope of wide dispersion, and has also been found in the spectrum of some of the fixed stars and nebulae, it had never been demonstrated to exist among terrestrial elements.

After the discovery of argon, Mr. Myers, the mineralogist of the British Museum, wrote to Professor Ramsay, calling his attention to the fact that cleveite (a uranate of lead, thorium and uranium) had been shown by Hillebrand to contain nitrogen. Myers offered the suggestion that this mineral might contain argon or might have some constituent capable of entering into reaction with argon.

This suggestion was later adopted by Professor Ramsay, who demonstrated that the resulting gas, after removing the nitrogen, not only contained argon, when subjected to spectrum analysis, but also showed a new series of lines in the red, green, blue and violet and notably a brilliant yellow line. Ramsay later sent the gas to Crookes for examination and he in turn reported that the bright yellow lines were undoubtedly due to helium. Experiments made gave 3.89 as the maximum density of the gas, and the ratio of the specific heats was found to approximate 1.66.

The gas is then, as was to be expected from its existence in the chromosphere, very light, and it appears to be monatomic.

Helium has been found in a number of minerals, almost all of

which contain either uranium, yttrium or thorium. It has also been found in the gas emanating from several of the European thermal springs and has been definitely proven to exist in liquid air. From observations that have been made it has been determined that this element is one of the constituents of our atmosphere in the ratio of 1 or 2 parts in a million. The latest determinations of its density appear to make it about 1.98 and its atomic weight about 396.

*Other Members of the Group.*—Professor Ramsay, in a lecture before the Deutsche Chemische Gesellschaft in December, 1898, gave an account of the steps which led to the discovery of the other members of the group.

The search for these elements was occasioned by an attempt to fit argon and helium into the periodic system. If 4 and 40 were assumed to represent the atomic weights of helium and argon respectively, there would be a space to be filled by an element having an atomic weight about 16 higher than helium.

The quest, begun by Ramsay and Collie and continued by Ramsay and Travers, opened with a careful re-examination of the minerals which had proved to be a source of helium. The search was later extended to other minerals of different chemical character, but with uniformly negative results. Meteorites and the gases from mineral springs were equally unproductive.

Attention was then turned to argon, and its study in connection with liquid air. It was pointed out that the atomic weight of argon would be more tractable if it could be reduced to below 40, and a search after a constituent of the air having a lesser density than 20 seemed worth the making.

In preparing to liquefy a quantity of purified argon, with the aid of liquid air, it was thought worth the while to examine the last fractions of some evaporating liquid air. After removing the oxygen and the residual nitrogen, Ramsay found that there were present, in the spectrum of the residual gas, a number of the new lines, notably a yellow line not identical with that of helium, and a new green line. The gas had a density of 22.5 instead of 20 and the ratio of specific heats of the mixture of gases was found to closely approximate 1.66. Here, then, was a new element or elements, but not the one sought for. Ramsay, assuming the presence of one only, gave it the name "Krypton" (the concealed one).

This gas has been studied more closely since that time. It is

estimated to be present in the atmosphere in the ratio of about 1 part of gas to a million of air. The density of the gas is estimated to be about 40.78 and its atomic weight 81.56.

In the subsequent experiments that were made with liquid argon it was found that the first fraction, from the boiling argon, had a density of 14.67 and a ratio of specific heats of 1.66; the spectrum showed, beside the lines of argon, a number of new lines of red, orange and yellow of marked brilliancy. After some further separation of the contained argon the density was found to be 9.76. This new gas, which was designated as "neon," while it still contained a fraction of argon, also contained helium, which would tend to decrease the density of the mixture somewhat.

Later experiments appear to indicate that this gas has a density of about 9.96 and an atomic weight of about 19.92. It is present in the atmosphere to the extent of from 10 to 20 parts in a million. The less volatile portions of the liquefied argon they considered to contain at least two additional elements besides krypton and argon. To one of these they gave the name "Xenon" (stranger), and while they did not have an opportunity to study it in a perfectly pure condition, they determined its density as being from 40.5 to 41.1. Later investigations appear to indicate that xenon has a density of about 64 and an atomic weight of 128. It must be considered as an extremely rare element occurring in the atmosphere in the proportion of  $\frac{1}{20}$  of 1 part to a million of air.

The fourth component of the less volatile portion was given the name "metargon." It was a source of much perplexity, as its spectrum was found to resemble the so-called "swan spectrum" of carbon monoxide. Subsequent study showed that the supposed new element was indeed carbon monoxide which had been introduced by accidental impurities in the chemicals used.

All of these elements are gases and all are chemically inert; it would appear self-evident, therefore, that they would form a distinct class of their own; but how to fit them into the existing periodic system developed a problem that has been attacked by several eminent European scientists, and has also been the cause of considerable discussion pro and con as to the elementary character of these substances, and the correctness of the available data concerning them.

Several schemes have been proposed to fit them into the periodic

system in a rational and satisfactory way. The one proposed by Ramsay is given below :

H	He	Li	Be
1	4	7	9
F	Ne	Na	Mg
19	20	23	24
Cl	A	K	Ca
35'5	40	39	40
Br	Kr	Rb	Sr
80	82	85	87
I	X	Cs	Ba
127	128	133	137

It will be noted that hydrogen, according to this arrangement, becomes the first element in the halogen group—a position for it which had been suggested by several eminent scientists.

The inert argon group, according to this classification, would hold the position between the very active halogen and the sodium groups.

M. I. WILBERT.

#### INTERNATIONAL STANDARD OF POTENT REMEDIES.

Among the basic principles discussed and subsequently adopted by the International Convention for the Unification of the Formulas for Heroic Medicines, which met at Brussels, September 15th, none perhaps is of more direct interest to the American medical practitioner than that establishing at 10 per cent. the strength of tinctures of active or potent remedies. This is especially opportune with the present revision of the U. S. Pharmacopœia. The importance of the subject is emphasized in an article on tincture of aconite read at the meeting of the American Pharmaceutical Association held recently in this city by M. I. Wilbert, apothecary to the German Hospital. He points out that the U.S.P. tincture of aconite is seven times as strong as the British preparation, three and a half times as strong as the German preparation, and nearly double the strength

of the French preparation. That it has been recognized that the strength of the U.S.P. tincture is excessive, is shown by the repeated reduction of the percentage. The tincture originally represented 65 per cent. of the crude drug, and was reduced in 1850 to 50 per cent., and in 1860 to 40 per cent., where it remained until 1890 when it was reduced to 35 per cent. We understand that there is now a movement to return to 40 per cent., for no reason other than that 40 per cent. is the official strength of the tincture of *veratrum viride*. The tinctures of many other potent drugs are from 50 per cent. to 100 per cent. stronger than the proposed international standard. These variations in strength become of very serious moment when we consider the potency of the preparations, their widespread use, and the fact that foreign medical literature is freely abstracted and liberally commented upon in medical journals. Comparatively few physicians are in a position to familiarize themselves with the differences in the strength of galenic preparations in different countries—hence, the possibility of serious consequences from the use of potent remedies in dosage advocated in foreign publications. A uniform standard should be adopted, and this standard should be international as well as national. For instance, were tincture of aconite reduced to the same strength as tincture of belladonna, it could be administered in the same dose, and—a matter of some importance—the difference between the average medicinal dose and the lethal dose would be greater. The facts cited should enlist the attention of the Committee on the Revision of the Pharmacopœia, with a view to the adoption of the strength-percentage recognized by the Brussels convention.—Editorial in *Amer. Med.*, 1902, p. 721.

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## PHARMACEUTICAL MEETING.

The regular monthly pharmaceutical meeting of the Philadelphia College of Pharmacy was held on Tuesday, November 18th, Mr. Warren H. Poley, President of the Philadelphia Association of Retail Druggists, acting as chairman.

Mr. M. I. Wilbert was the first speaker and read a paper on "Some New Soap Preparations," samples of which he exhibited. (See page 587.)

In reply to a question as to the advisability of dispensing the soap preparation containing benzin, Mr. Wilbert and Mr. Poley both said that it was customary to use a special caution label in such cases. Mr. Poley also said that the city authorities are taking steps in regard to the storing of benzin in drug stores. Dr. Lowe said that the insurance companies limit the amount to five gallons, and Mr. Kebler said that they would not even permit a large firm to keep a plumber's lamp containing benzin. In regard to the shades of soap, Mr. Kebler said that these depended upon the kind of vessel in which the soap was made—that made in a copper vessel being comparatively dark, and that made in an iron kettle still darker. He said that the light product was looked upon as impure, while in reality it is the purest, it being made in a porcelain vessel. Mr. Kebler also remarked that he had found phenolphthalein unsatisfactory for determining the alkalinity of soap.

Mr. William B. Marshall read an interesting paper entitled "Tea: Its History and Commerce," and exhibited a number of photographs, samples, etc., in connection therewith.

In reply to a question by E. M. Boring in regard to tea-growing in the United States, Mr. Marshall said that it had been very successful in South Carolina, and further said that it has been found that a number of plants and some animals do better in other countries than in their native countries, and he hoped that since the Agricultural Department had taken up the subject, tea would become an article of agriculture here. Dr. Henry Leffmann referred to a recent article in the *New York Medical Record*, in which the writer recommended the use of tea as a remedy for cholera in the Philippine Islands, owing to the bad quality of the water there. He claimed that the Chinese are comparatively free from cholera, and attributed this to their custom of tea-drinking, the otherwise bad water being boiled and thus disinfected. In response to a question by Mrs. Julia Davis Chandler, Mr. Marshall said that in some parts of Japan the flowers of certain plants, as of camelia and olive, are used for perfuming teas.

Mr. Harry Matusow spoke of the method used by the Russians in making the infusion of tea. A very strong infusion is first made and then a small quantity of this is diluted with hot water.

Mr. Marshall further remarked that the price paid for tea in this country is not regulated by the price in foreign countries, but that

it is based upon the quality as determined by the tea-tasters in this country. The tea-tasters become quite expert and the prices as set by them are quite uniform for the same grades of tea. Mr. Kebler said some experts could tell oil of wintergreen from methyl salicylate, while a chemist could not do this from analytical figures. Mr. Boring said that he recently rejected a lot of beeswax on appearance alone, which he subsequently ascertained contained about 80 per cent. of paraffin.

Professor C. B. Lowe was the next speaker, and described some of the detail methods which he employs in the conduct of his store.

In the discussion that followed, Mr. Poley recommended the use of a sailor's needle for removing corks, and said that the convex side should be placed next to the cork. Mr. Matusow said that a dentist's instrument is also useful for this purpose, and Mr. Leedom said that he found a shoemaker's awl useful.

In regard to the filtering of solutions to be dispensed, Professor Remington said that it was a mistake to use filter paper at all times; it took frequently considerable time to do this, and a small strainer answered the purpose better in many instances. Mr. Leedom suggested that simply filtering through cotton was convenient; and Mr. Wilbert and Mr. Boring both stated that foreign objects, such as pieces of cork, might be removed from solutions by the use of a toothpick.

Mr. Poley said that in the dispensing of solutions for the eye, the patient should be cautioned against the use of droppers that had previously been used. Mr. Boring exhibited a large bottle which had contained collodion solution of salicylic acid and upon the sides of which the salicylic acid had beautifully crystallized out.

Mr. Lyman F. Kebler read a paper on the "Distribution of Arsenic."

In the discussion of this paper, Dr. Leffmann said that it illustrated the saying that everything exists in everything. He said that Professor Crookes had found yttrium, one of the rare metals, widely distributed, although in small quantities. Referring to the presence of arsenic in chemicals, he said that since its interference in the new contact method for the manufacture of sulphuric acid had been eliminated, we would be relieved of the danger of arsenic from iron pyrites. He also said that perfect purity practically does not exist.

H. K.



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<sup>1</sup> Compiled by F. Yaple.

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